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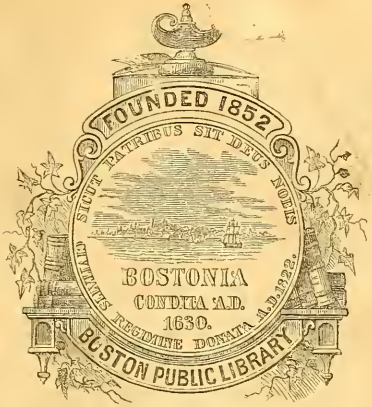

PAMPHLETS.

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NEW-YORK TRIBUNE.

USEFUL WORKS FOR THE PEOPLE....NO. II.

IMPROVEMENTS

IN

AGRICULTURE, ARTS, &c.

OF THE

UNITED STATES.

BY HON. HENRY L ELLSWORTH,
U. S. COMMISSIONER OF PATENTS.

TO WHICH IS ADDED

A TREATISE ON RAISING SWINE,

AND THE

BEST METHODS OF FATTENING PORK.

ALSO,

A TREATISE ON GEOLOGY

AS CONNECTED WITH AGRICULTURE.

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THE

IMPROVEMENTS

IN

AGRICULTURE AND THE ARTS

OF THE UNITED STATES,

AS SET FORTH LUMINOUSLY AND AT LENGTH IN A REPORT TO THE CONGRESS OF THE UNITED STATES.

BY HON. ~~W. H.~~ ELLSWORTH,
COMMISSIONER OF PATENTS.

PATENT OFFICE, January, 1843.

In compliance with the law of Congress, the Commissioner of Patents has the honor to submit his annual report.

Five hundred and seventeen patents have been issued during the year 1842, including *thirteen* re-issues, and *fifteen* additional improvements to former patents, of which classified and alphabetical lists are annexed, (marked B and C.)

During the same period, three hundred and fifty-two patents have expired, as per list marked D.

The applications for patents during the year past amount to *seven hundred and sixty-one*, and the number of caveats filed was *two hundred and ninety-one*.

The receipts of the office for 1842 amount to $35,790 96, from which $8,068 95 may be deducted repaid on applications withdrawn, as per statement E.

The ordinary expenses of the Patent Office for the past year, including payments for the library and for agricultural statistics, have been $22,154 48, leaving a net balance of $5,264 20, to be credited to the patent fund, as per statement marked F.

The above expenditures do not include those incurred within the last year, for the recovery of the stolen jewels.

For the restoration of models, records, and drawings, under the act of March 3, 1837, $14,060 02 have been expended, as per statement marked G.

The whole number of patents issued by the United States, previous to January, 1843, was *twelve thousand nine hundred and ninety-two*.—The continuance of the depression of the money market, and the almost universal prostration of all business, operates very disadvantageously on the receipts of this office, as many hundred applications are delayed solely from the want of funds or difficulty of remittance. The patents granted for the year, however, exceed those of the year previous by *twenty*, though there have been less applications by *eighty-six*.

The Digest of Patents, continued and brought down to January, 1842, has been printed, and 700 copies distributed to the respective States, and 200 copies deposited in the library, in compliance with the resolution of Congress directing the same.

The accommodations granted during the last year for the reception of the articles received through the exploring expedition, entrusted to the National Institute, must seriously thwart, if not suspend, the design of Congress in the reorganization of the Patent Office, which enacts, section 20, act of July 4, 1836, "that it shall be the duty of the Commissioner to cause to be classified and arranged, in such rooms and galleries as may be provided for that purpose, in suitable cases, when necessary for their preservation, and in such man-

ner as shall be conducive to a beneficial and favorable display thereof, the models, and specimens of composition and fabrics, and other manufactures and works of art, patented or unpatented, which has been or shall hereafter be deposited in the said office."

While the annual receipts of the Patent Office above the expenditures are sufficient to carry out fully the benevolent object of the National Legislature, the want of room of which it is thus deprived will be, for a time, an insurmountable obstacle, as all the room in the gallery could be advantageously used either by the Patent Office or the National Institute. No remedy, therefore, remains, but an extension of the building, which might be done by the erection of a wing sufficiently large to accommodate the Patent Office on the first story. The building can also afford room for lectures by professors, should they be appointed under the Smithsonian bequest; and may I be here permitted to observe, that a gratuitous course of lectures in the different branches of science would certainly do much to diffuse knowledge among men. I can confidently say, that the agricultural class look forward with bright anticipations to some benefit from the Smithsonian bequest, and to the time when the sons of agriculturists, after years of toil at the plough, can attend a course of lectures at the seat of Government, and there learn, not only the forms of legislation, but acquire such a knowledge of chemistry and the arts as will enable them to analyze the different soils, and apply agricultural chemistry to the greatest effect. Such encouragement will, indeed, stimulate them to excel in their profession, while others, deemed by many more favorable, are indulged with a collegiate course of education. Little, indeed, has been done for husbandry, by the General Government; and, since eighty per cent. of the population are more or less engaged in this pursuit, the claim on this most beneficent bequest will not, it is hoped, be disregarded. The National Agriculture Society, in connection the with Institute, will most cheerfully aid Congress in carrying out their designs, for the great benefit of national industry.

It is a matter of sincere congratulation, that the Patent Office has so far recovered from its great loss in 1836, by the conflagration of the building, with all its contents. A continued correspondence with 11,000 patentees, and untiring efforts on the part of all concerned with this bureau, has accomplished much; indeed, to appearance, the models are better than previous to the fire. Although something yet remains to be done, enough has been accomplished to remove the past embarrassment, and afford applicants the means of examination as to the expediency of applying for a patent.

The loss of the library, sustained by the fire, is not yet fully repaired; and, since the law of 1836 makes it a duty to examine all applications for patents, with reference, also, to foreign inventions, it is absolutely necessary that the library should be extended.

It is true that the library of Congress possesses some books on scientific subjects, useful for reference in the labors of this bureau, but no permission isgiven to take out books from that library; and if such liberty were granted, it would be bad economy to send an examiner to the Capitol, to look up similar cases. If applications are to be examined, it will promote the despatch of public business, protect against spurious patents, and give public satisfaction, if the Patent Office library is well supplied with necessary books.

Already, hundreds of applicants are satisfied, by the comparatively imperfect examinations now made by referring to books on hand, not to take out a patent; and when, in the rejection of cases, reference is made to foreign patents, there is an impatient desire to see the description of the invention that is to cut off the hopes of so many years of toil and labor. I would therefore most earnestly recommend an appropriation of $1,200 from the surplus fund, to add to the Patent Office library.

The annual agricultural statistics, comprising the tabular estimate of the crops for the past year, with accompanying remarks and appendix, will be found subjoined, (marked A.)

The value of this document to the whole country, from year to year, it is believed, would justify a much larger appropriation from the Patent Office fund for this purpose. The diffusion of such information may save millions to the laborious tiller of the soil, besides adding directly to his means of export many millions more. An examination of this subject, and the expediency of fixing it on a more permanent and advantageous basis, by the constitution of an agricultural bureau, or at least an agricultural clerkship, at a moderate expense, to be drawn from the patent fund, is respectfully suggested. The additional benefit which might thus accrue to the population of our widely extended country would soon be seen.

A sufficient appropriation to allow a personal examination of the various parts of the country by some one well qualified for such duty—similar to what has been attempted with so much success by some of the State Legislatures—would, it is believed, realize a vast amount of practical good, especially to the South and West, by furnishing the data on which they might direct their products to the best markets, for domestic sale or foreign export.

Such, indeed, are the great benefits to result from personal observation and critical examination, not only of the crops, but agricultural implements—such the importance of explaining the new improvements, and collecting and distributing all the acclimated seeds, which are proved to be so signally productive or beneficial, that the Commissioner of Patents has doubted whether a modification of his duties, in connexion with the Patent Office, would not be more useful to the community. During the last year, he embraced the opportunity, while travelling, to examine the crops in ten States; and though the examination was of course imperfect, it enabled him the better to digest the somewhat discordant materials from which the agricultural statistics here incorporated were compiled. If millions can be saved to the public, if the agriculturist can be encouraged in his all-important pursuits, by the expenditure of a small sum from the annual surplus of the patent fund, what better destination could be given to this amount? Would not the people heartily approve and earnestly second such an undertaking.

All of which is respectfully submitted.

H. L. ELLSWORTH,

A.—*Tabular Estimate of the Crops for* 1842.

States, &c.	*Population, according to the census of* 1840.	*Present population, estimated on the annual average increase for* 10 *years.*	*Number of bushels of Wheat.*	*Number of bushels of Barley.*	*Number of bushels of Oats.*	*Number of bushels of Rye.*	*Number of bushels of Buckwheat.*	*No. of bushels of Indian Corn.*
Maine	501,973	532,102	1,091,090	355,265	1,236,964	165,640	58,467	1,188,728
New Hampshire	284,574	287,646	533,006	123,589	1,542,653	349,520	127,052	220,183
Massachusetts	737,699	774,536	209,547	155,660	1,603,014	563,078	100,928	2,202,113
Rhode-Island	108,830	112,319	3,688	67,921	207,983	41,860	3,611	542,896
Connecticut	309,978	313,671	104,673	30,988	1,575,715	886,372	367,615	1,827,771
Vermont	291,948	294,884	564,116	54,393	2,863,648	265,363	254,419	1,391,595
New-York	2,428,921	2,592,044	11,132,472	2,196,081	24,882,671	3,280,306	2,917,974	13,311,616
New-Jersey	373,306	389,050	874,643	12,791	4,319,103	2,201,592	959,543	5,000,105
Pennsylvania	1,724,033	1,836,773	10,887,015	194,805	24,120,363	8,368,661	3,119,831	13,553,360
Delaware	78,085	78,384	333,065	5,019	1,077,988	40,448	14,443	2,381,766
Maryland	470,019	476,900	2,814,553	3,590	3,112,928	739,187	89,144	5,615,640
Virginia	1,239,797	1,248,314	7,502,383	98,914	14,264,539	1,186,449	326,961	38,101,657
North-Carolina	753,419	758,048	1,747,334	4,000	4,409,247	231,197	20,322	25,332,194
South-Carolina	594,398	798,361	1,059,885	3,870	1,581,323	53,990	.....	16,492,216
Georgia	691,392	829,058	2,203,737	12,728	1,724,779	70,635	550	24,072,043
Alabama	590,756	675,116	933,248	7,942	1,827,408	62,220	66	26,345,105
Mississippi	375,651	477,360	346,275	1,822	826,243	13,590	83	7,693,771
Louisiana	352,411	393,745	.....	.....	121,715	2,109	.....	7,857,362
Tennessee	829,210	873,400	5,915,033	4,964	8,235,816	356,229	21,141	55,742,384
Kentucky	779,828	807,401	5,131,114	16,045	8,550,760	1,987,236	10,961	49,053,849
Ohio	1,519,467	1,711,935	25,387,439	229,282	19,381,035	994,085	741,230	39,424,221
Indiana	685,866	788,415	8,500,666	31,602	8,059,424	210,268	63,175	38,838,275
Illinois	476,183	638,784	5,799,038	98,862	8,639,231	130,776	79,326	25,546,728
Missouri	383,102	456,974	1,424,545	11,078	3,127,840	82,854	19,440	25,338,922
Arkansas	97,574	117,728	3,079,077	905	294,801	9,280	126	7,816,255
Michigan	212,267	266,363	3,952,389	152,933	3,822,281	53,946	160,781	3,703,589
Florida Territory	54,477	60,399	660	50	14,346	348	.....	769,420
Wisconsin Territory	30,945	43,322	434,409	14,840	666,599	2,952	16,964	630,904
Iowa Territory	43,112	60,456	341,801	1,368	379,885	5,889	9,525	1,788,580
District of Columbia	43,712	48,611	10,629	315	13,329	5,269	331	45,998
	17,069,453	18,742,109	102,317,340	3,871,622	150,883,617	22,762,952	9,483,409	441,829,246

A—Continued.

States, &c.	Number of bushels of Potatoes.	No. of tons of Hay.	Number of tons of Flax and Hemp.	Number of lbs. of Tobacco gathered.	Number of lbs. of Cotton.	Number of lbs. of Rice.	Number of pounds of Silk Cocoons.	Number of lbs. of Sugar.	Number of gallons of Wine.
Maine	12,504,308	788,129	4,210	82	.....	.....	582	291,268	2,237
New-Hampshire	8,218,369	455,271	29,102	290	.....	.....	765	203,635	97
Massachusetts	4,821,308	683,011	914	97,297	.....	.....	24,818	548,833	196
Rhode-Island	1,105,874	66,548	102	499	.....	.....	819	60	740
Connecticut	3,304,798	522,451	4,702	630,275	.....	.....	117,086	61,952	1,824
Vermont	10,941,718	880,379	32½	781	.....	.....	6,256	6,147,211	104
New-York	36,880,017	3,835,300	1,665	1,086	.....	.....	4,296	13,353,109	4,960
New-Jersey	2,991,933	443,221	2,422	2,958	.....	.....	3,592	79	8,895
Pennsylvania	12,724,180	2,316,009	3,298	480,374	.....	.....	21,707	3,487,025	17,742
Delaware	265,780	25,297	59	401	.....	.....	3,260	.....	288
Maryland	1,003,679	96,173	557½	21,199,696	6,037	.....	6,180	47,910	7,458
Virginia	3,468,709	422,924	28,768	59,627,369	2,643,529	3,239	5,877	1,869,439	13,704
North Carolina	3,758,618	128,346	12,314	16,129,474	41,339,557	3,491,667	6,125	10,712	33,892
South Carolina	3,257,195	28,362	.....	55,654	54,859,979	70,265,554	5,033	37,776	640
Georgia	1,974,282	19,376	14	141,523	152,260,770	14,535,309	5,478	431,530	8,787
Alabama	2,208,406	18,423	7½	264,018	99,279,317	167,421	5,245	12,993	341
Mississippi	2,106,244	784	23½	145,212	161,127,267	934,755	190	155	17
Louisiana	1,057,824	29,717	.....	118,146	125,157,528	4,000,500	935	98,101,793	2,302
Tennessee	2,431,078	39,876	4,112	28,289,171	27,221,826	9,063	7,182	304,300	689
Kentucky	1,538,851	108,672	11,056	45,494,083	639,408	17,773	4,265	1,553,846	1,820
Ohio	7,277,309	1,237,712	11,136	5,264,766	.....	.....	7,924	7,906,162	12,275
Indiana	2,233,761	1,359,269	10,658	2,660,408	168	.....	628	4,383,885	10,964
Illinois	3,266,693	236,611	2,549	984,960	214,007	718	2,907	473,981	744
Missouri	1,006,707	64,907	27,421	12,727,350	149,889	.....	190	371,200	32
Arkansas	456,633	791	1,766	212,266	10,868,366	6,547	196	2,455	.....
Michigan	3,816,985	169,829	1,143	2,725	.....	.....	1,192	2,294,084	.....
Florida Territory	327,900	1,575	3	86,877	7,565,583	574,728	417	298,589	.....
Wisconsin Territory	573,071	49,843	3¾	362	.....	.....	27	171,465	.....
Iowa Territory	315,134	23,028	531	11,153	.....	.....	.....	59,152	.....
District of Columbia	45,997	1,521	.....	65,654	.....	.....	962	.....	.....
	135,883,381	14,053,355	158,569¾	194,694,891	683,333,231	94,007,484	244,124	142,445,199	130,748

AGRICULTURAL STATISTICS.

REMARKS ON THE TABULAR ESTIMATE, &c.

The tabular view now given, presents, in a condensed form, the results of the various crops during the past year. To prepare it has been no easy task. The sources of information principally relied on have been the different agricultural societies, addresses, an extensive correspondence, with personal application to many throughout the whole country. To those who have thus contributed to our means of knowledge, the public are under no light obligations for the promptness and efficiency with which they have replied to the questions for information; and this success makes the regret the greater that an answer could not be be obtained in every case, so as to incorporate yet further knowledge, so acquired, in this statistical report.

The progress of each crop, however, from its seed time to its harvest, has been carefully noted, and the various causes which might affect its increase or decrease, taken into consideration. The aim has been, as far as possible, to exclude from the elements of which the estimate was to be compounded every thing which could not lay claim to reliable accuracy.

Still it is evident, that in the present dearth of means in our country for extensive statistical investigation of the kind most necessary, an approximation to the truth is the most that can be attained. This is all that has been attempted; and it is hoped that as close and accurate a view as the means at command and time for the purpose would allow, is thus furnished. It will be recollected that the estimate must be finally settled after the crops have been gathered in, the latest of which reach to the month of December; so that the preparation of the whole must chiefly be comprised in the compass of less than two months.

It is often, too, not a little difficult to reconcile conflicting statements and calculations, either of which, so far as it appears, are entitled to equal credit with the others, and yet which give no clew as to the basis on which they are formed, and by the careful examination of which, they could be verified or disproved. Great vagueness likewise exists in the slight notices found in many of the agricultural journals, where something like a record of the crops from month to month, usually forms a part of their columns. An effort has been made to sift out the truth, and so to weigh the evidence and compare the various results as to give at least a bird's-eye view of the whole. If any should question the correctness, or if subsequent sources of information should show that we have been mistaken, no one, we are certain, can impute it either to want of diligence in collecting, or to the sparing of any effort to discriminate and to ascertain the truth.

PROGRESS OF IMPROVEMENT.

The *progress of improvement* in agriculture, though gradual, is yet steady. The importance of this branch of industry, is beginning to be more and more appreciated. The whole country is more or less interested in it, as it furnishes, besides what is consumed at home, at least three-fourths of all the exports of the United States.—The vast public domain of unsold lands, too, will be affected by this progress, and its value proportionably advanced. It may be well here to mention some of the principal sources of this improvement.

CAUSES OF IMPROVEMENT.

The *geological surveys* ordered and in progress, or recently completed, in many of the States, besides the other important benefits thereby conferred on those States, have contributed much to advance the science of husbandry.

These, in connexion with the experiments of agricultural chemistry, by thus directing the attention to their analysis, are developing the nature of the soils and their adaptation and means of increased production, by different seeds, products, and methods of cultivation and manures, and so enable the farmer or planter to use the varieties of his land to the best advantage.

The increasing number of *agricultural periodicals* and treatises, and their cheap and more extensive circulation throughout the land, are also producing a happy effect. The farmers and planters in the various sections of our country are thus brought acquainted with each other's operations and success, and also with the methods of cultivation and rearing of stock, &c., common in England and on the continent, new products and the result of their trial are noticed, and the knowledge of many useful discoveries thus extended. The prejudice against "book farming," as it has been termed, which has so long proved a barrier to the adoption of valuable improvements thus suggested, is gradually wearing away; and a happy combination of science and practical skill is thus secured, the results of which are every year becoming more and more apparent.

Agricultural societies also exercise great influence in furthering the progress of agricultural industry. These are of but comparatively recent date, and their institutions and increase in number and prosperity serve to mark the progress of improvement in agriculture; and if still further aided by an efficient board of agriculture, like what exists in Great Britain, they would no doubt be yet more successful. It is only about fifty years since that board was there established, and it has proved of extensive benefit to that active empire. By means of these societies, great numbers of the agriculturists of our country are brought together, to compare notes, as it were, to observe each other's success, and to converse on the topics connected with this branch of industry. They examine the machines, implements, animals and products, offered for exhibition, and are induced to bestow more care and labor in the selection of their seeds and stock, in the preparation of the soil, and in their tillage and harvesting.—Every year new and valuable improvements are thus made known and introduced, by which many are essentially benefited. Premiums also encourage to effort, and a highly salutary incentive is furnished, in the honor to be acquired of successful and approved farming. A similar effect, too, results from the bounties given by the different States to encourage the culture of some particular product. These have never been offered without a new impulse being stirred, and leading to in-

creased attention to the pursuit. Some of the States in these respects are far in advance of others, but almost all are beginning more to appreciate their true interest, and seeking to extend their true prosperity.

While adverting to the causes of general improvement in the agriculture of our country, it may not also be improper to allude to the increased habits of *temperance and sobriety* of the laborer, by which the condition of the farm-house and farm is so essentially benefited, and domestic happiness and effective strength promoted. A clear head and a vigorous frame, in combination, will ever be most successful in tillage, as in every branch of industry. The lengthening of life and the repair of health, thus secured, render many who have been but drones and mere consumers, also active and efficient producers, as well as healthful consumers. The amount added, too, in the increased skill, as well as the saving from less breakage of tools and machinery of labor, and the actual effectiveness of such laborers as have heretofore been drawn from the intemperate class, now reformed, constitute no small item of gain in this view of the subject. No little damage has been thus sustained in the "inebriate" management and cultivation of the land, which is now avoided. Were this the proper place, some most interesting deductions might be made as to the physical force and efficiency thus added to the various branches of industry, and the bearing of the whole on agriculture, as a source of our national wealth.

ELEMENTS OF THE ESTIMATE.

The great and general elements which must be taken into consideration in forming this annual estimate are, (and this is also a stated or permanent cause)—

1. The *annual increase of our population* naturally, and also from emigration, and hence, consequently, of our laboring force. While it has usually been computed that the proportion of the whole population engaged in agriculture, or depending on it for a livelihood, is equal to at least 83 per cent., the last census shows that over 2,700,000, or more than one-fifth of the whole, constitute the effective force of male laborers.—This is nearly three times more than are employed in manufactures and trade, commerce and navigation, taken together. In Great Britain, the proportion is also large—9,000,000 are said to be engaged in agriculture, to 4,000,000 employed in the manufactures. A per centage, therefore, equal to one-fifth of the annual per centage of the increase of our population must be allowed on most, if not all, of the crops, in forming the agricultural statistics, as one of the usual natural elements of which the estimate is to be compounded.

2. The quantity of *new land* now first rendered productive. This applies with much force to several of the later States. The attention of the settler is at first turned to the clearing up, fencing, and putting in order his grounds; and thus, three or four years may often elapse before his land is made to reward his toil in large and full crops.—Such a cause has been assigned, the past year, for the greatly increased production of the wheat crop in Michigan. The same cause will probably prove, to a limited extent, a stated one for some years to come. Similar to this, too, is the restoration of lands either wholly or partially worn out from excessive cultivation, by enriching them with suitable manures. Considerable attention, and with good success, has been directed to this object, for the last two or three years, in the older States. Thus, many acres of land, in Virginia, have been recovered by marling.

The opening, too, of new means of communication, (railroads, canals, &c.,) bringing the market nearer, has induced large appropriations of land to particular crops; nor has the expectation of the revival of the manufactures and business generally, by means of the encouragement of a home policy, been without very marked effect.

3. Yet another element of calculation deserving notice is what may be called, perhaps, accidental or occasional—such as the failure of some particular crop the previous year, and the endeavor to supply the deficiency by planting more seed and increased attention the next year. So the failure of an earlier crop, if known in time, may lead to the attempt to produce the larger growth of a succeeding one. It sometimes also happens that, owing to some cause affecting the growth the previous year, the seed within reach is not so productive as usual. The drain likewise on the stock that may be on hand, by a lively market, may operate in a similar manner. Some of these causes just mentioned have not, it is true, operated very extensively the past year, as the crop of the previous year was a good one, and there has been no greatly increased demand in the market for the different products; yet, in forming our estimate, it seems no more than proper to keep them ever in view. The relative proportion of the various kinds of products used has considerable influence in determining their amount and home consumption, as more is required of some products to furnish the same nutriment than of others. Of two articles, either of which can be used to advantage at home, the producer will usually dispose of that which will command the highest price in the market, though this may, perhaps, force him to look for his own supply for home consumption to the inferior articles.

The diversion of laborers from or to other kinds of industry, in consequence of the suspension or revival of the same, also deserves attention. Changes of this description often have a very perceivable effect in regard to some particular results, as well as the general aggregate of production.

4. The operation of striking peculiarities of the season, the increase or decrease of the insect tribes that are hostile to various crops, may very properly be ranked under this class of accidental causes. Our country, indeed, is so extensive, and ranging through so many different temperatures, that this variation of the growing season must be expected. Yet, while this necessity exists on the one hand, we seldom find, on the other, that the cold, or drought, or rainy weather, or the ravages of insects, so hurtful to different products, is universal. Some portion, at least, is more favored than another, and thus the similar crop escapes the injury which lessens the amount of production elsewhere; and hence we seem most effectually secured against any of those alarming failures of entire crops which have

caused so great distress in England and other countries, as well as are ready to take advantage of any favorable increase of our trade in these products to foreign parts.

5. There is yet another element to be regarded in forming our estimate—that which is found in the superior productiveness of the crops, arising from the influence of the weather, improved seeds, implements of husbandry, tillage, and various unmentioned causes, combined. Were the improvements on seed simply to be estimated at 10 per cent. only on the crops, it is said on high authority, that this would amount in value to $20,000,000, or more. A season more than usually favorable at the time, or just after planting, while the crop is in progress, or at the period of harvesting or gathering, will often add vastly to the amount of the productions. The improved culture, selection of seeds, and early attention to the rotation of crops, exhaustion, and manures, will, no doubt, preserve the new States from the results which have been so fatal to the older ones, in impairing their lands, and thus losing their adaptedness to some particular crop.

All of these elements have been kept in view in the preparation of these statistics, and their compounded influence, as far as it might be estimated has been the rule of judgment, in connexion with the actual statements of the crops, in the various parts of the country. It cannot be expected that their application should be brought out in detail, with reference to every product in the table, though some such reference will be often found in the review of the crops, as they will hereafter be mentioned singly. An error sometimes occurs in estimating the product of a particular crop, derived from the amount brought early into market, occasioned by some unusual activity in pressing it forward with the surplus stock of the year previous remaining on hand, as commanding a better sale, and enabling the producers to realize comparatively a better profit. It is unsafe to rely at all times on such data, though they should be suitably regarded. For want of reflection on this cause, persons may often form a very incorrect estimate; and such seems to have been the case, in some degree, during the past year. Interested men may, likewise, sometimes so contribute to influence the market price, or the demand, that unfounded expectations may be excited, which, however, are nothing more than temporary, and secure no lasting profit. False intelligence is given by some, either with the corrupt purpose of gain, or from sheer ignorance of the facts of the case—and this is caught up and circulated from one part of the Union to the other. Hence the necessity of closely discriminating the actual, or the probable, from the merely possible results of the numerous influences affecting the great staple products of our country.

THE SEASON.

The season, taken as a whole, has been most propitious. Suitable alternations of warm and cold, of wet and dry, have, for the most part, rendered the weather genial in its influence on the vegetable kingdom. Yet, in a country like ours, of such vast extent, reaching through such varieties of clime, it cannot be supposed that all parts are equally favored at every season. Portions of the country have suffered during the past year. In the earlier period of the seed time and germination, frosts and cold, in some of the States, affected the grain, and prevented its forming so full as would have been the case had the weather been more favorable. The long-continued heavy rains in the months of July and August also did great damage to the crops in Maryland, Virginia, and North Carolina; and tobacco, wheat, maize, &c., were much injured in consequence. To some extent, too, the cotton crops suffered from the same cause in parts of Mississippi and South Carolina; yet in no one instance is there what can be termed the entire failure of the product. Less injury, perhaps, than usual has been experienced from blight and the ravages of insects; and the granaries and storehouses throughout the country, almost literally groaning beneath the burden of our harvests, can testify how truly we are lapped in plenty.

REVIEW OF THE CROPS.

A more particular review of the different crops, corresponding to that of the last year's report, will furnish a summary of such information as could be gathered, as to the state of agriculture in our country. It is confined to certain products, as these were the ones specified in the late census, on which the estimates were originally based. The same remarks which are made with respect to one product may sometimes apply with equal force to another, bearing the same general characteristics; especially is this true as regards the various species of grain, and reference may also be made to the agricultural statistics of last year's report, for some facts relating to particular crops, which are now deserving of notice.

WHEAT.

The crop of WHEAT was a large one. More than a third of this product, as will be seen, is raised in the Western States. Of course, the causes which have occasioned a decrease in some portions of the Atlantic States have but slightly affected the whole aggregate. In the Western States, more wheat was sown than in any year before. The probable reason of this was, that it commands a better price, one nearer a recompense of labor, or more immediately, than any other product of the soil; and that the Canada market offered greater inducement for exportation than heretofore.

The reports respecting this crop are quite various. In the New England States it has been better than it was the year previous, though but little comparatively is raised in this section of the country. It bears, however, a very good proportion to the amount of population. In New Hampshire, the grain on the wheat crop has been estimated by a good judge on these subjects as high as 25 per cent.

New-York is one of the greatest of the wheat-growing States near the Atlantic coast. In the eastern river counties, in the northern section, and in the Mohawk valley, the crop is pronounced to be "good," "better than the year before." In the valley of the Mohawk, heretofore the weevil has proved a destructive enemy; the past year, however, the cause has been less injurious. In the central, southern, and western sections of this

State, the wheat crop was comparatively lighter than usual. In the western region, which is the great wheat-growing section, this was not so much owing to winter killing and insects, although these last appeared; but the causes of the failure assigned are the want of its *stooling* out properly, and shortness of head, on account of the unusual cold and wet of the months of May and June, while it was in the incipient formation of the germ. When this is the case, no after culture or change of season, however favorable, can remedy the injury. It was indeed supposed, and so published, on information derived from those who formed their judgement merely by a cursory examination while passing the fields, that the crop would be a very large one, the most abundant ever known; but, when it came to the harvesting, the above-mentioned causes were found to have greatly affected it, so that the deficiency has been estimated, on good authority, equal to from 20 to 25 per cent.

In New-Jersey, in quality it is thought to have been as good as in the previous year, but the quantity is not so great. The vast quantities raised in the Western States have a tendency, of course, to lessen the amount sown in the Atlantic ones—as it is impossible for these to enter into competition, at the expense of harder tillage and manuring of their land, with the rich and extensive fields beyond the Ohio river.

Pennsylvania is a large wheat-growing State, and the information respecting the crop here is varied. The fly, rust, smut, and wet weather, are assigned as causes of a decrease probably equal to 20 per cent. of the whole crop. Near Philadelphia, in the counties of Chester, Delaware, and Lancaster, the season was favorable to this product, and less so to the propagation of the fly. It is possible, too, that the introduction and acclimation of the Mediterranean wheat in that region has had some influence in baffling those great enemies, the rust and fly. The objections formerly made there by the millers are now relinquished, and it is found to answer their purposes as well as any other kind of wheat. Magnesia liming has proved very valuable in this section, and much poor land has been greatly improved, and hence a surplus raised. In a part of the region bordering on the Susquehanna river, the rust and smut have very seriously affected the crop, so that it was thought to have been not more than two-thirds of an average one. In the western section, especially the southwestern region, a moderate winter is assigned as the cause of increase to this crop of perhaps one third, though the wet weather during a part of the season, also to some degree affected it unfavorably.

In Maryland, in the eastern and central counties, the crop was much affected by the blight and the rains which took place during the harvesting. In its first growth it appeared beautiful, but proved to be a great failure: the fly, too, was destructive in some portions. In the upper counties, however, there appears to have been more than the usual average.

Virginia, which ranks as the third of the great wheat-growing States, called the Atlantic States, has suffered much as regards this crop during the past year. There is much complaint of the rust. It has been thought that the crop east of the great mountain ridge, is at least one-third less than the usual one. The long-continued and heavy rains in August, destroyed a large portion of the crops on James river, as also in other parts of eastern Virginia, as was the case too in North Carolina contiguous. The rust likewise materially diminished it in portions of the western region of this State.

The wheat crop of Georgia is described by some as having been "hardly a fair crop," "inferior to that of the preceding year," while others term it, on the whole, "a fair," "an average" one.

From the information obtained, a judgement is formed of the wheat crop in Alabama, that it was more than the usual average one.

In Mississippi there has been quite an increase, and it is judged that there is more now raised than is wanted for their own consumption.

The crops in Tennessee and Kentucky were, according to the different accounts, "good," "an advance on the former years," "20 or 25 per cent. better."

Ohio is the greatest producer of all the wheat-growing States. A much larger quantity than usual was sown in many parts of the State, and the yield has been most abundant. In some parts, the increase is estimated even as high as "50 per cent.," in others at "not less than 30," "25," or "20" per cent. In the Scioto valley, not so much was produced as was expected, as the filling out became checked by the warm rains, not long before it was harvested. A much larger quantity, however, was sown, and there was more raised than ever before. The late sowed, too, in particular regions of that great State, suffered partially from the rust, and the fly also affected unfavorably portions of the crop.—This insect enemy is said to be increasing in Ohio, and threatening that beautiful wheat-growing region, and serious apprehensions are expressed respecting its future ravages, unless some means be found to check its progress. The subject is one that deserves attention. A suitable reward offered might possibly lead to the discovery of some means for destroying an enemy which has already proved of such injury to the wheat fields of other States. The Governor of Ohio, in his late message, estimates the wheat crop of that State, for 1842, at 24,000,000 of bushels. This nearly corresponds with the one in the table formed independently, from various sources of information, and based on the consideration of the elements heretofore described. He supposes that this crop, after deducting sufficient for the home consumption, will allow at least 14,000,000 of bushels for exportation.

In Indiana and Illinois, both the cut and army worms made their appearance, and the crop was somewhat injured by them, but the aggregate of the crop was large. Here, as in Ohio and some of the other States, an increased quantity of land was devoted to this crop, and the yield was much more than an average one. Indeed, the increase has by some been rated as high as 50 per cent.—Some idea of the increase of the trade in wheat here may be formed from the fact that from Chicago there was shipped to Buffalo, in 1840, only 20,000 bushels; while in 1841, in the same period, not less than 200,000 bushels of wheat were

shipped. The quantity during the same period last year was doubtless much larger. For the year 1843, it is said that in the fall of 1842 one-half more seed has been put into the ground than any previous season in Illinois; so that, if the coming season should prove favorable, a still greater crop may be expected.

In Missouri, also, the wheat crop was slightly affected by the army and the cut worms; but it proved to be an unusually large one, not less, according to some estimates, than 25 per cent. better. From Arkansas, too, the accounts are equally favorable; and the growth of the last year has been pronounced by some to have been at least double.

In Michigan, likewise, which is destined to be one of the greatest wheat-growing States, there has been an unusual advance on the preceding years. The quantity which has just been brought under successful cultivation was large. The sudden rise of price about the time of putting in the seed, and the favorable season, are also causes to which the great increase may be attributed. It is thought that there has been at least 50 per cent. more sown, and the yield from 25 to 50 per cent. larger. The surplus is great, and the nearness to the Canadas will no doubt enable many of the enterprising farmers of Michigan to derive a handsome profit from their labor. In the southwestern section of the State, portions of the crop were injured by threshing it out in wet or damp weather. The fertile sections of the Territories of Iowa and Wisconsin, also, by the increased production of last year, promise much hereafter.

The wheat lands in the West are so rich in proper qualities that probably for years no injurious effects of a constant succession of this crop need be apprehended; but in western New-York, and perhaps in some of the earlier settled sections of Ohio, there is some danger, and the attention of the people has been called to the subject. Liebig, the distinguished author, speaking of Virginia, says: "Harvests of wheat and tobacco were obtained for a century from one and the same field, without the aid of manure; but now, whole districts are converted into pasture land, which, without manure, produces neither wheat nor tobacco. From every acre of this land there were removed, in the space of one hundred years, twelve hundred pounds of alkalies, in leaves, grain, and straw. It became unfruitful, therefore, because it was deprived of every particle of alkali which had been reduced to a soluble state, and because that which was rendered soluble again in the space of one year was not sufficient to satisfy the demands of the plants. It is the greatest possible mistake to suppose that the temporary diminution of the fertility in a soil is owing to the loss of the humus. It is a mere consequence of the exhaustion of the alkalies." This is high authority, though it has been questioned by some writers in the agricultural papers. It is important, therefore, that the wheat lands should be kept up by the use of manures; they will supply those qualities of the soil which are thus exhausted.—For this purpose, a rotation of crops also is recommended, as it has been found (and this seems to be the true secret of the benefit of the rotation of crops) that, after wheat has been harvested from a field, some other plant will restore the alkali so abstracted, and thus bring back the soil to its pristine fertility.

Some products do not so far effect the soil but that by manure they may be kept up on the same field for a long time. Some also improve the soil; others only impoverish it; while by others, still, it is supposed to be entirely exhausted. To this latter class, among others, belongs wheat. Saltpetre and nitrate of potash are mentioned in the late works of Professor Johnstone on agricultural chemistry as most valuable manures for wheat; and he proposes various modes to ascertain which of these two is the better adapted to the purpose. With regard to wheat, also, it may be observed, on the authority of the celebrated Sprengel, professor of agriculture in Brunswick, that the best grain for bread is not the best grain for seed; that we may increase the nutritious quality by the manure, but for seed, this highly nutritious wheat is unsuitable. "Seed corn," (*i. e.* wheat,) he says, "must contain the different ingredients in due proportions; if any one of them be deficient, or in excess, the plant will be proportionably imperfect. This was the result of careful analysis of a great variety of grain grown on an equal variety of soil. Some soils always produce good seed grain, while others are found which seldom do it. The first are never rich in humus or nitrogen, but well supplied with lime, magnesia, potash, salt, phosphates and sulphates. Corn or wheat manured with sheep dung contains too much gluten for seed grain, which, in germination, re-acts so powerfully on the starch as to overpress the conversion into sugar, (the chief nourishment of the germ,) and produce vinegar. The best seed wheat must contain much starch, and little gluten—thus the starch is gradually converted into sugar. Hence seed grain should not be raised on very rich and highly manured soil, for this would derange the natural proportions of gluten and starch, while the grain would be the better for bread. This may be the secret of grain and potatoes deteriorating in highly cultivated districts."

The cause of the rust in wheat and other grain is exciting increased attention; and the doctrine which seems to be now gaining advocates is, that it is owing to an excess of nourishment.

Respecting the Hessian fly, Mr. W. H. Hill, in the Nashville Agriculturist, says, that for fifteen years his wheat did not feel the effects of it, while others did so in his vicinity. He sunned his wheat two days before planting, and, besides, chose large full grains, by passing it through a sieve. An interesting letter relating to the Mediterranean wheat, and showing that it was unaffected by the fly, may be found in Appendix, No. 1.

The entire aggregate of the wheat crop of the United States was 102,317,540 bushels, being an increase of 10 per cent., or 10,674,683 bushels, on last year. The price of wheat has been affected by the quantity raised, and various other causes. Much less has been used for distillation. In the single State of New-York, there has probably been a decrease from this cause of 3,000,000 bushels, as there has been a failing of the manufacture of ardent spirits of 10,000,000 gallons. The introduction of threshing machines deserves mention in this connexion. In many places these are driving out of use the flail. Persons travel about with them, and thresh out the grain for

from 3 to 5 cents per bushel, and they will thus thresh large quantities in a single day. The price of horse power and threshing machines is now so reduced that the farmer, either singly or by combination, will find his advantage in purchasing the same—thus reducing the expense of their threshing to one-half the cost of hiring.

BARLEY.

There is reason to believe that this crop has made no advance the past year. The attention of the public has been so successfully directed to the discontinuance of the use of malt liquor, which possesses an intoxicating quality, that the encouragement offered for its cultivation is becoming less from year to year; except in New-York, the amount raised is not large. The information gained as to its yield is also less certain than with regard to most other crops. It forms so small a portion, that it is often passed over, as not deserving notice in the general record, which, in many cases, is confined to the leading products. It is believed, however, to have been similarly affected with the other grains. The aggregate crop of the past year is estimated at 3,871,622 bushels. This species of grain Loudon considers next in importance to wheat in Great Britain. In Sweden and Lapland it is more cultivated than any other grain, on account of requiring to be so short a period in the soil—sometimes not longer than six weeks, and seldom more than seven and a half. In Spain and Sicily they have two crops a year on the same soil. The climate in which it delights is warm and dry; and it is said there are instances of its being sown and ripened without having enjoyed a single shower of rain. In parts of Great Britain it is in considerable use as a material for bread, and, also, fattening black cattle, hogs, and poultry. As it is a tender plant, and more easily injured than wheat, it is also more expensive of cultivation.

In a country like ours, where wheat is so abundant, the inducement to raise it is comparatively small.

OATS.

This, as it is the hardiest of them, is a larger crop than all the other cereal grain, except maize, or Indian corn. It is one which, to some extent, is affected by the season, similarly with that of wheat; though, coming into harvest later, it may not suffer to the same extent from the rains of August. The past year has been more favorable to oats than was the year previous. It will be recollected that the crop of 1841 was estimated as under an average one. In 1842 it is thought to have been above an average one. In the New-England States, where it ranks higher in amount than any other grain, it was a good crop. In New-York, which produces the greatest amount, it was unusually large; a greater quantity was sown, and the yield per acre was estimated at 25, 30 or even 50 per cent. better than the year previous. The late sowed, in some cases, were injured by the rains of September; but even with this deduction the crop was, probably, the greatest ever known. In New-Jersey, Pennsylvania, and Maryland, it is described as having been a good crop. In Virginia it was, for the most part, better than an average one; in some sections of the State, 30 per cent. more; in some others it was destroyed by the 40 days' rain of the summer. In North Carolina, Georgia, Kentucky, the crop was "good." an "increased" one, "very fine," 20 or 25 per cent. better than in 1841. In Tennessee, Louisiana, and Ohio, with some exceptions, the crop of oats has been estimated, by judges, at an advance on the year 1841. The same was the case with Indiana, Illinois, Michigan, Missouri, Wisconsin, and Iowa. Arkansas and Louisiana raise but a comparatively small amount.

The whole aggregate of this crop, the past year, is estimated at 150,883,617 bushels.

RYE.

Pennsylvania is the greatest producer of this crop; and from various sections of the State the report is, that it has proved "a good one," "an average" one, "a full crop," "20 per cent. better," "one-third in advance of the last year's."

In New-York, too, which ranks next in the amount raised, it seems to have been unusually large, "20 per cent. more," in some parts of the State, than years past.

In the New-England States, also, the crop was a good one. In Virginia it was subject to the same vicissitudes as the wheat crop. In Kentucky, where considerable quantities are raised, it was better than last year. The same was likewise the case with Ohio. The entire aggregate of this crop amounts to 22,762,952.

BUCKWHEAT.

Nearly two-thirds of this crop are raised in the three States of New-York, Pennsylvania, and New Jersey. In New-York, the increase is thought to have been from 20 to 30 per cent. In New Jersey, though it suffered somewhat from the frost, yet it was, on the whole, a good crop. In Pennsylvania, it is described as having been in different parts "not so good as in 1841;" an "ordinary," "a full crop," or "one-third in advance of former years." In South Carolinia, Georgia, and Alabama, Mississippi, Louisiana, and Arkansas, scarcely any is raised. In Ohio, it bore about the same per centage as the other crops. The entire crop is estimated at 9,483,409 bushels. McCulloch says, that about 10,000 quarters, or 80,000 bushels, are annually imported into Great Britain.

MAIZE OR INDIAN CORN.

With slight exceptions, this favorite crop seems to have been a large one the past year. Nearly every State in the Union reports a considerable gain. The notices, however, are modified, now and then, by allusion to unfavorable seasons and causes injurious to its growth.

In New England it was larger than in the previous year. In Maine it is described as "good," "15" and even "33" per cent. higher. In New Hampshire, "fine, matured without frost," "10 per cent.," "25 per cent.," and by some even as a "double crop," and the increase is attributed to the season, as respects the rain, &c.; while in other portions of the State the early dry and cold season is said to have nearly ruined many fields, so that it was at least from 20 to 50 per cent. worse. In the other New England States, the report, on the whole, is favorable.

In New-York, in the river counties and in the southern and northern section, for the most part it was good, perhaps 15 per cent. better than in the year previous. In the Mohawk valley the first crop is pronounced to have been 15 per cent. better, but the second one (replanting) 10 or 15 per cent. worse. In the western section of the State, owing to the unusually wet and cold weather of May and June, the crop fell off, it is thought, 50 per cent.

In New Jersey, also, there seems to have been a perceptible decrease.

In Pennsylvania, with few exceptions, it appears to have been less than an average—in some sections one-half or one-fifth decrease—much rain in the planting season having injured it. In other parts, however, it is said to have been an increase of at least from 20 to 30 per cent. on former years. The same diversity existed in Maryland. In some parts of the State the crop was an increased one, or better than in 1841. In the early part of the summer this crop suffered most severely on the Eastern Shore, from the army worm, and in the principal corn-growing counties of Somerset and Worcester the crop has proved an entire failure. These counties have heretofore been considerable exporters, furnishing more than any other two counties in the State, and they now have not enough for home consumption. The extent of the loss may be seen from the statement that where 2,000 bushels usually grow, the past year there was but 200; only 10 bushels instead of 800, 80 for 1,500, 50 for 600, and 150 for 1,800. The cause is said to have been partly the "warm winter, which failed to kill the hurtful insects, but mainly the result of heavy rains," which, beginning early in June, continued six weeks. To this succeeded the grub worm. The consequence has been great suffering, and made a large section dependent on exportation.

In Virginia, the corn crop was better than usual, but suffered much by the heavy rains, by which in some sections it was nearly destroyed, and in others was kept back by the dry weather. But where these causes did not exist to injure it, the yield was above an average one, and has been rated by some as high as 30 per cent. increase; as a whole, however, this would probably be much too large.

In North Carolina, likewise, the crop was much lessened by the great quantity of rain. Indeed, on some parts of the seaboard it was almost entirely destroyed. Nearly one-third of the State was visited by successive inundations, which inflicted vast loss on the inhabitants. From exporters, they must now become buyers. The city of Charleston, it is said, has usually received not less than a millio of bushels from this whole region. This has bee a serious calamity, and occasioned great distress.

In South Carolina, the crop appears to have been better than in the previous year. The same was the case in Georgia, where it is thought to have exceeded the crop of 1841, which was a remarkable one by from 10 to 20 per cent. In Alabama and Mississippi it was large and abundant. In Louisiana, 25 per cent. better. In Tennessee and Kentucky, which are the two greatest corn growing States, the crop appears to have been a good one over all these States. It is variously described in different sections, as "a fair crop," "about as in 1841," "very good," "fine," "excellent," "12½ or 25 per cent. better than last year."

Ohio ranks next in the amount produced, and the accounts are more at variance as to the increase or decrease. On the whole, it would appear that in the northern section of the State, though there was much more planted, yet, owing to the extreme cool and wet season, the crop was not as productive as in the previous years. Perhaps it was not more there than one-half or one-third of the usual one. In the more southern parts of the State, however, it is described as having been "as good," "better," than in the year 1841. The early part of the season here, also, was too wet and cold to afford much promise; but the weather in the season of earing and filling out proving congenial, the crop was much beyond a medium one.

It was also good in Indiana and Illinois, both of which are large producers of corn. In Missouri and Arkansas, the increase is variously estimated at from 25 per cent. up even to 50 per cent. In Michigan, owing to the low price of pork, and that some of the other products commanded a better price, comparatively, less was planted than usual. Still the crop was a fine one. This crop was also as good, or even better, than usual, it is believed, in Wisconsin and Iowa. The whole crop of corn in the United States for the past year is estimated at 441,829,246 bushels.

If the manufacture of sugar from the corn-stalk succeeds, as it promises to do, it is probable a larger quantity of corn will be planted in future. Some remarks on that manufacture may be found under the subject of sugar, below.

POTATOES.

It will be recollected that, in several sections, during the year 1841, this crop suffered very greatly, and came near a failure. This year's product is much larger than the former, taken as a whole, though in some parts there has been a decrease from the average. Still, even in these cases, it is not so remarkable as in the previous year.

Maine is a large producer of this crop, and perhaps more were planted last year than was the case in the year before; but the yield, on the whole, was not greater, though the quality is said to be much superior. In New Hampshire, it is variously estimated at from 10 even up to 50 per cent. increase in different parts of the State. Vermont ranks very high, in proportion to her population, as a potato-growing State; and the crop was probably equal, if not superior, to that of the former year. In the other New England States it is described as having been from "10 to 20 per cent. better," or, "as good as an average one."

New-York stands, however, foremost of all the States in its production of potatoes. The eastern and southern sections seem to have yielded an increased product, and even an abundant one; in the northern, it was an ordinary one; in the valley of the Mohawk, about the same as usual; in the western, it was affected by the unpropitious weather, and fell off, it is thought by some, not less than 50 per cent.

In New Jersey, the production was, by some,

considered a fair one; by others, to have been 20 per cent. better than in 1841.

In Pennsylvania, with slight exceptions, it is described as being "better," "very large," "30 per cent. advance." In the southern central region, it is said to have been "not so good, by 30 per cent."

In Maryland, in the upper part, large quantities were raised, and the yield was a good one.

In Virginia, with the exception of sweet potatoes, there are but few raised east of the mountains. In the northeast part of the State it has been estimated as high as 30 or 33 per cent. increase. On the Ohio river, in the western section, the crop was hardly an average one.

In South Carolina, North Carolina, and Georgia, where also the sweet potato is raised, the crop was an "increased one," and in some sections even "abundant." The same remark applies to Alabama, Mississippi and Louisiana. In Kentucky, Tennessee and Ohio, likewise, it is said to have been "a fair one," "good," "very good," "many more than the year before," "10, 15, 25, or even 33 per cent. better than in 1841."

The potato crop was also much better than usual in Indiana, Illinois and Michigan.

In Florida, this product, as well as most others, owing to the season, was 25 per cent. better, though on account of the war, the quantity of land tilled has been small.

In Wisconsin and Iowa, like as in the case of most of the other crops, a very considerable addition must be made to that of the previous year.

The whole number of potatoes raised in the United States during the past year is estimated at 136,883,386 bushels.

HAY.

Taking the States where this product is principally gathered, it must be pronounced to have been considerably above the average one. In several States, especially at the South and West, very little attention is paid to this crop. In New-York, which ranks the highest, the quantity of hay gathered was in advance of the preceding year. In the New England States, with perhaps the exception of Maine, New Hampshire and Massachusetts, also, there was a larger growth. The drought affected it somewhat, and caused it to fall short perhaps 10 or 20 per cent. The quality of the crop also was injured, even when the quantity was not lessened, as it was less sweet and nutritious. The same remark may also be made as to the growth in New Jersey, where the crop was increased. In Pennsylvania, which ranks second in the amount raised, the yield in some parts was abundant, and has been estimated as high as 30 or even 75 per cent. better than in 1841. This, probably, is too large, but from 15 to 20 or 25 per cent. may be nearer the truth. In the Susquehanna region, however, it is said to have fallen off greatly. In Maryland, on the whole, it might be termed a fair yield.

That of Virginia, as a whole, was an average one, though in some parts of the State it was above the usual growth. The early rains aided it in certain sections, as they did likewise in North Carolina.

In Kentucky, in certain sections, as on the Cumberland river, and in the southern central ones, owing to the drought, the hay crop suffered. In other parts, as also in Tennessee, this cause did not exist, and it is pronounced to have been "excellent," "from 25 to 50 per cent. better."—Ohio, Indiana, Illinois, Michigan and Missouri, though devoting comparatively little attention to its production, yet seem to be making some advance in the same; and accordingly there has been some increase the past year, though doubtless not a very material one. Some damage was experienced from the invasion of the army worm, but not enough to lessen the crop to any great amount. Though reliance is still placed on the prairie hay, yet there is a gradual improvement with respect to the introduction and cultivation of the tame grasses. The low price of grain in New Orleans will no doubt lessen the demand for pressed hay, which has heretofore been a considerable article of export from the States bordering on the Ohio river and its branches. The whole number of tons of hay raised in the United States in 1842 is estimated to have been 14,053,355 tons.

FLAX AND HEMP.

These products have been put together in the tabular estimate, as they were so in the report of last year, in consequence of being so found in the census statistics, on which the statistics of the report of 1841 were based. Less confidence can perhaps be placed on the estimates of so comparatively small a crop, raised in moderate quantities, scattered over a whole State, than with respect to almost any of the other common crops. There has been, then, only such an attempted alteration of last year's estimate as the general information derived would seem to justify. In two States, however, with respect to HEMP we can speak with more certainty—Kentucky and Missouri. It will be recollected that in the two former years (viz. 1840 and 1841,) the hemp crop was quite deficient, and proved almost a failure. The past year has been much more favorable.—The crop of hemp is a large one, and it is variously described, as "very fine," "the best ever raised," "25 or 50 per cent. increase on the average one." The attention is still directed, and it would seem with somewhat more success, to the discovery of a process of water-rotting hemp; and it is hoped that the difficulties on this subject may yet be removed. It is stated that, in consequence of the promise last winter of sending out a Government agent to purchase water-rotted hemp for the navy, the farmers of Kentucky and Missouri, have water-rotted 700 tons or more.—This, at the prices paid by the Government for Russian hemp, is worth $200,000. Many specimens, it is further stated, have been examined, and that it has been pronounced equal to Russia hemp. Were a suitable reward to be offered, to stimulate the ingenious, it can hardly be doubted that, by a variety of experiments, some process of preparing it for the use of the navy, as well as the Russia hemp, might be found out.

An important discovery, respecting the application of waste hemp to the purposes of paper-making, has recently been announced; and if, when it is sufficiently tested, it proves all that it promises, it will afford an additional inducement to the culture of hemp. A process is said to have

been found out, by which hemp can be made white as snow, and that it can be used in manufacturing the finest and whitest paper; and a belief is entertained that hemp waste, which can be furnished at two cents per pound, will ere long be sought for by paper-makers, to supply the place of linen rags.

Hemp is beginning to be raised somewhat more in the Northern and Eastern States. This is true especially of the northern part of the State of New-York. At present, however, it is confined to the seed crop, owing to the high price of the seed. It is affirmed to be a mistake to suppose that it must be confined to alluvial lands, as has been shown by the farmers of Saratoga and Washington counties, in the State of New-York. We import hemp, or hempen articles, some years, $9,000,000 or 10,000,000 in value. It is worth from $200 and upward per ton. When planted in drills, at a suitable distance, as it should be, and properly cultivated, hemp generally produces, it is said, from 20 to 40 bushels of seed to the acre; and instances are not rare of its yielding from 50 to 60. The seed is generally worth from three to six dollars per bushel. When sown for the lint, it should be sown broadcast, from two to three bushels of seed to the acre, depending on the quality of the land; and it usually produces from 700 to 1,000 weight of clean hemp to the acre. Much valuable information respecting the culture and importance of this crop may be found in the files of the Kentucky Farmer for the last few years.

Flax was once an article of considerable export, and now may be again raised profitably for the seed. In the year 1770, the quantity of seed exported amounted to 312,000 bushels. For twenty-two years previous to 1816, the average annual export was about 250,000 bushels. The reason why less attention is paid to the culture of flax now is, that it is so exhausting a crop. By a rotation of crops, however this difficulty, it is presumed, might be in a great measure avoided.—The smooth rich prairies of the West afford an excellent opportunity for raising flax to any extent; and, since linseed is an article which bears exportation so well, many thousand acres might be cultivated to advantage, especially as the crop may be either pulled by machinery, or, if seed is the only object, it may be cut with like facility.—The aggregate amount of flax and hemp, according to the tabular estimate for 1842, was 158,569 tons.

TOBACCO.

This crop, except in comparatively small quantities, is confined to six or eight States. It forms, as it is well known, the great staple of Virginia and Maryland, besides being largely raised in Kentucky, Tennessee, and Missouri. The crop for 1841, it may be recollected, was generally considered above the average, and by some as even a large one. That of the year 1842, on the contrary, has proved a failure. The general report is, that it is poor both in quantity and quality. In Maryland, however, it is said to be better in quality than it was the year previous. Wet and dry weather, at different times, lessened the average amount.

In Virginia, where the usual average is estimated by good authority at 50,000 hogsheads, it is said to be "one of the worst ever gathered," "not more than two-thirds of a crop," "light and of a bad quality;" and the wet weather is assigned as the principal cause of the decrease. The plants were injured in the bud, by the rains.

In middle Tennessee, also, the tobacco crop was "not more than two-thirds of one," while in some other parts of the State it is said to have "doubled the usual crop," or "better in quality, though somewhat less in quantity." The low price of the previous year is said to have induced less planting, and the growth was not so large. In the western part of the State, however, increasing attention is given to this product.

There is the same diversity in the accounts as respects Kentucky. In some parts of that State the crop was "not more than two-thirds of an average one," "not so good by 10 per cent." In others it is termed "very fair," "better than usual," "perhaps 10 per cent. better." It is said that there are in this State not less than 5,000,000 acres of land which would admit of the cultivation of this product, and on which it might be raised at the rate of 600 lbs. per acre.

The crop of tobacco in Ohio and Indiana may be described in language very similar to that used respecting Kentucky. In Missouri, it is said to have been an improved one; more was planted, and there was a better yield.

Increasing attention likewise is paid to the culture of tobacco, and with success, in Illinois and some of the New England States.

The recent information furnished in the letter of the Secretary of the Treasury, respecting the amount of home consumption, and exports of tobacco, with a great variety of other particulars, will enable any one to form a fair conclusion as to its importance and bearing on our trade with foreign countries. It is there stated that the whole amount supplied elsewhere than from the United States is about 150,000,000 lbs.; the amount of possible consumption of American tobacco is put at not less than 1,000,000,000 lbs.; so that, were only one half of this quantity actually consumed, it would be four times more than our present export, and increase our means more than $20,000,000 annually. The quality of the different kinds of tobacco raised in different parts of the United States, with the different kinds of manufacture and use to which they are particularly adapted, are also pointed out in various discriminating remarks.—Nearly one-tenth of the whole population of our country are said to be engaged in the cultivation of this product, two-thirds of whom are in the four States of Virginia, Maryland, Kentucky, and Missouri. The whole tobacco crop for 1842 is estimated at 194,694,891 lbs.

COTTON.

This great staple, from all accounts, appears to have yielded a large crop. It is somewhat difficult to reconcile the conflicting statements respecting its growth and prosperity; but, after a careful comparison, and endeavor to arrive at the truth, the result is as above estimated.

The crop for 1841 was considerably below an average one. That of 1842 is much above the former, and, by some, is thought to have been

equal to that of 1839, which was an unusual one. Subsequent information may, perhaps disprove particular estimates, and some may be misled by the fact that a larger quantity than usual was brought into market at an early period. It may be well, however, to mention more in detail some of the statements which have been gathered respecting its progress. Passing over the lesser amounts, and commencing with North Carolina, the cotton crop is said to have been 20 per cent. better than in 1841, and the cause assigned is, the favorable weather in the early part of the fall and the season when the frost usually takes. The Crop of South Carolina, also, is said, to have been as a whole one-third better—the warm, dry weather proving congenial to its growth. In other parts of the State, it is said that "much of the finest cotton on the low grounds was swept off by the overflow; others injured by the warm and dry weather; the wet weather also injuring that which was open, so that it could not be handled well."—In Georgia, it is variously estimated at from 10 to 50 per cent. increase on the previous year.—"More was planted, and the cultivation was more productive; probably the best crop for many years." It is also affirmed that, at five cents per pound, this crop would be a better one than others. The crop in Alabama is also pronounced to have been "equal or 5 per cent. superior to that of 1839," though in some sections the dry weather and worm were subjects of complaint; and in some others, too, excessively wet weather. The aggregate in Mississippi is large, "better than in 1839, especially in the uplands; not quite so good in the lowlands." In parts of the State it was "injured by snails or slugs," as in Panola and De Soto counties; also, by the boring worm, in Wilkinson county; and the Southwestern Farmer, of September 30, 1842, published at Raymond, gives it as "short," and says that there was "a great quantity of rotten cotton." In the same paper, for December 23, 1842, the following opinion is expressed: "We should not take the surplus of cotton which has arrived in New Orleans this year over that which had arrived at the same port on previous years as any evidence of an extraordinary crop. The present fall has been unusually favorable for gathering the crop, and we believe planters will have finished picking at least earlier than common. Besides this, in our State much labor was turned to other products, and the little cotton raised has the more hands to pick it. Another circumstance will make the earliest shipments the earliest part of the crop. Cotton on the Mississippi is generally trifling, too, this season, and the crop from that quarter will certainly be short. On the other hand, however, we learn that the crops of Tennessee and North Alabama are very fine. So that, taking all together we should judge that the result will show our present crop to be a fair one." In the vicinity of Vicksburg, we are told that there was "an average crop on the uplands," and that "on the alluvial bottoms of the Mississippi it has proved very abundant and of good quality." In Louisiana, the cotton crop, as the Southwestern Farmer likewise asserts, was "much injured by the army worm, rust, rot, boll worm, and rains;" that from Opelousas to Alexandria, including all the adjacent country on both sides the Bœuf, there was but little more than half a crop, and the army worm was likewise "committing his ravages on the bayou Wookshu." On the other hand, it is estimated in other sections at "20 per cent. better than usual." The next producer of this crop, in amount, is Tennessee; and in the southern part of the State the crop is said to have been unusually good even "100 per cent. better" than the previous year.—In Middle Tennessee, some complaint is made of the "cotton louse." In the northern part of the State attention has been turned more to other products. The yield in Arkansas was "greater than ever before"—"double;" "the three counties of Sevier, Hempstead, and Lafayette, alone," it is supposed, would ship "30,000 bales," being "10,000 or 12,000 more than ever before in one season." In Florida, the crop is estimated to have been 25 per cent. better than the previous year.

The entire aggregate of the cotton-crop for the year 1842 is 683,333,231 pounds.

The present low price of cotton will probably turn off a portion of the laboring force usually thus employed to the cultivation of some other products. A planter of Alabama asserts that, by an improved process of culture, he has been enabled to raise from 3,000 to 5,000 pounds per acre on land which, under the usual system, would not yield more than from 300 to 500 pounds. In one of his letters to the Editors of the Albany Cultivator, he even says that he has actually picked the enormous quantity of 5,989 pounds on an acre, and affirms that he is prepared to prove satisfactorily "that it is perfectly practicable to produce the 2,000,000 bags—the cotton-crop of the United States—with *one-third* of the capital engaged, under the present system of culture in its production." Without any definite information as to his process, no opinion can be formed of its practicability. It seems, however, incredible; and no reliance should be placed on such prospects, until thoroughly examined and demonstrated conclusively by the test of rigid experiments.

Although the experiment of raising cotton in India has partially proved a failure, on account of the hot weather, winds, &c., as in the Bengal district, yet in some of the trials it has furnished so great encouragement, that we have reason to believe it will not be abandoned. The comparison of the cotton imported into England from India and the United States shows a steady advance on the amount received from the former country. Thus, in 1841, there were received from the United States 902,191 bales; from India 274,984 bales—being nearly equal to the entire consumption of cotton in the United States in 1840 and 1841, and more than one-fourth of the amount sent that year from this country; being also 50,000 pounds more than in the preceding year, in which the increase was at least 30,000 pounds. To show how this subject is viewed abroad, and without pretending to say how far the reasoning is justified by the assumed facts, we may here quote an extract or two from the letter of an intelligent writer from Liverpool, to his friend in Boston. He says:

"When in the cotton-growing section of the States, I was induced to think the India effort on the part of the Government would prove a failure. I based this calculation upon these data

that the skill, machinery, fertility of soil, cheapness of conveyance, and nearness to us, would enable the Americans to put down any competition. Since my return, I have conversed with a friend from India, who resided for a long time in Charleston, and was familiar with cotton-growing, and who is now engaged in its cultivation in the East, and, from facts furnished to me by him, I am satisfied I was wrong.

"The experiment in India will succeed, and the success will be both rapid and permanent. They will not only grow the cotton, but they will manufacture it, and supply us, besides, with large quantities of the raw material. What effect, you may ask, will this have upon the States? The first will be to drive the Americans out of the South American markets. In India, they manufacture a coarse fabric (which just suits that market) cheaper than the Americans possibly can, and consequently they will have in turn to yield. They can do a great deal more than most people, but they cannot compete with pauper-labor, or the cheap work of India, unless helped by home duties. The second effect must be to change the cultivation of a large number of the States engaged in the growth of cotton. The rich alluvial bottoms of the Mississippi may enable the planter there to cultivate cotton at four or five cents, with profit—I suppose it will; but in Georgia and the Carolinas, if I am any judge of soil, it cannot be done. If I remember right, the average crop in those States would not be more than 300 pounds to the acre; and if so, cotton-growing there will be a losing business."

Whether or not there is the immediate danger this writer predicts, of breaking up the cotton-trade of several States, the subject is one which, at least, demands attention. The evil may be more remote, but it can scarcely be doubted that a serious competition is threatened from a number of sources. It appears, from information from high authority, that the British manufacturer has already begun to supply a cheaper article, made of India cotton, to the South American market, at three cents a yard *cheaper*, and threatens to destroy effectually that market for our countrymen. If Texas becomes established on a firm footing, and at peace, so that her rich soil may be brought under productive cultivation, she will prove a powerful rival in raising this crop, and contending for the cotton-trade.

The attention of the French Government likewise is directed to means to advance the culture of this product in French Guiana; and the increase of it also in Egypt, though not indeed rapid, must be taken into consideration, in estimating the probabilities of competition. Eventually, Africa, on the western coast, may furnish cotton at a moderate price; though this cannot be for many years to come. The amount of the new crop of this year imported into Boston, coastwise, from 1st of October to 31st December, exceeds the amount of the previous year, for the same period, by about 9,500 bales. The fact that Great Britain is directing her energies to extend her territory, and open for herself markets, by commercial treaties as well as by conquest, where she can, and especially that she has avowed, and stills avows, her determination to become independent of us in respect to cotton, should teach us that she will never relinquish her purpose without, at least, a most severe struggle. The planter, therefore, must expect competition with the world over, wherever cotton can be produced; and that it can be on nearly one-third of the habitable globe we have high authority for believing. While such competition continues, no great advance can be hoped for in the price of our own, especially so long as the great powers of Europe are at peace with each other. One thing, however, is certain, that no country can raise better cotton than the United States; and the reduction of wages and peculiar adaptation of soil and climate, will it is believed, enable the American planter to contend successfully in competition for many years to come.

The following table, taken from the Liverpool Price Current, under date of December 9, 1842, is subjoined, as showing the comparative prices of cotton from different countries, and the sections of the globe where the staple is cultivated

Bales.	*Sales of the week.*	*Ord. to mid.*			*Fair to good fair.*			*Good to fair.*		
		d.		*d.*	*d.*		*d.*	*d.*		*d.*
190	Sea Island	8½	to	9½	11	to	13	17	to	21
30	Stained	4	to	5¼	6	to	6½	7	to	8
5,740	Bowed, Georgia	4	to	4⅞	5¼	to	5⅝	5⅝	to	6
4,440	Mobile	4	to	5	5¼	to	5½	5⅞	to	6¼
	Alabama and Tennessee	3¾	to	5⅝	4⅞	to	—			
7,220	New Orleans	4	to	6	5⅜	to	5⅝	6	to	7
70	Pernambuco & Parubia.	6½	to	6¾	7	to	7¼	7⅜	to	7¾
	Aravati and Ceara	6¼	to	4½	6⅝	to	6¾			
230	Bahia and Mario	6	to	6¼	6½	to	6⅝	6¾	to	—
1,180	Maranham	5½	to	5¾	6	to	6¼	6½	to	—
	Saw,ginned, do	5	to	5½	5¼	to	5⅜			
470	Egyptian	6¼	to	6½	6¾	to	7	8	to	9
60	Peruvian	4¾	to	5	5½	to	5¾	6	to	6½
	Laguayra	4½	to	4¾	5¼	to	5½			
	Common West India	4½	to	5	5¼	to	5½	6	to	—
10	Carthagena	3¾	to	3⅞	4	to	4⅛	4¼	to	4½
3,400	Surat	3¼	to	3⅜	4	to	4⅛	4¼	to	4½
100	Madras	3¼	to	3½	3⅞	to	4	4¼	to	4½
23,150										

RICE.

In South Carolina and Georgia, where by far the largest portion of this crop is produced, it is said to have been a good one, equal or superior to that of the previous year. This article was formerly exported in the form of what is called clean rice, but of late years a much larger quantity is taken to England in a rough state, called *paddy* or cargo rice. She however, relies much for that article on that which is brought from India, where vast quantities are produced. The whole aggregate crop for the year 1842 was, by our estimate, 94,007,484 pounds.

SILK.

It is evident that the feeling with reference to this product, is settling down on a more assured basis. While some, remembering only the days of the morus multicaulis speculation, smile and turn with incredulity from its very mention, others have learned to discriminate between the solid and the imaginary, and are realizing, if not the golden dreams of past years, at least a fair profit, which not even the ridicule that is not always spared will easily tempt them, by abandonment of their object, to forego. The crop is increasing, not indeed with great rapidity, but with a steadiness, and among a class of persons who have turned their attention to it, that promises to render it one of permanent interest. The inflation of speculation has passed away. Sober practical views are adopted, and the calculations of those best informed on the subject are sufficiently cheering to warrant eventually, as they should now satisfy, the feelings of the most sanguine. In twelve of the States a bounty is given; and comparison of this, from year to year, is said to leave no doubt that the product doubles, one year with another. It will be found that in every State the silk culture has increased.

In New England, the attention is turning yet more towards it, and much practical skill in management of the worm and modes of manufacture is continually acquired. Large crops of cocoons have been raised in the States of Ohio, Indiana, Kentucky and Tennessee. In Pennsylvania, in one small district, not less than 3,500 pounds of cocoons are said to have been raised. The manufacture of the silk, too, at the west and elsewhere, keeps pace with its production. There will be, it is said, several thousand yards woven in Ohio, this season, (1842,) and several hundred in Indiana. Besides the larger establishments, there are also a large number of family machines, making sewings and organzine, which last is the most profitable article, as it is worth from $5 to $10 per pound in the gum. Sound practical farmers are going into the business of silk-growing, and this will tend to give it still more permanence. It is believed that not less than 2,000 bushels of cocoons have been produced the past season in middle and west Tennessee. At one establishment in Ohio, four dollars per bushel is paid for cocoons, and the manufacture of silk goods is said to be at the rate of one thousand dollars per month, and at a profit of 10 per cent. over all the cost.—One person is the proprietor of three large cocooneries, and expected to feed two millions of worms, which he calculated would yield him upwards of six thousand cocoons, worth at the then prices, in October last, two thousand dollars, but which, by his own manufacture of the same, would be worth much more to himself. A convention of silk-growers was held at Northampton, Massachsetts, in September, 1842, at which much valuable information was communicated, by delegates and letters from various parts of the Union, as to the progress, method, &c, of culture of the plant and feeding the worm. This has been imbodied and published in a small pamphlet, of which we have freely availed ourselves. The same causes which had a transient influence on the culture of silk, have proved equally unfavorable to other products; the frosts and the unusual weather of August and September injured not less the crops of corn, the vines, and the grain and fruit, than the worm.—The permanent causes of soil and climate, in general, however, are thought to be as favorable to the production of silk as to that of any other product. It can be cultivated in all the States, and there is, therefore, nothing to forbid its yet being cultivated in all parts of the Union. The mulberry tree is indigenous with us as well as in China, and this seems to indicate that Providence has designed this country to be more or less engaged in this pursuit. The business, too, is one in which the aged and the feeble can be employed, and the children of many a family may thus be trained to useful industry, as well as kept from idleness and poverty, if not also from vice, crime, the prison, and a shameful death. One who has paid much attention to the subject, mentions that he is confident the business is a profitable one, and that it will sooner or later become one of the staple interests. The South appears to afford peculiar facilities for conducting this culture, on account of the climate; and although it is now for the most part abandoned, yet there it offers strong inducements to that section, as an object of attention, which may come in to take the place of cotton when the low price of that product renders it unprofitable of cultivation. The decline of the business in that region is not to be attributed to any inherent difficulties, or to the discovery that the business is impracticable or unprofitable, but to the disappointment of high-raised expectations, excited during the mania of multicaulis speculation.

The American raw silk, it is perfectly established, is in quality superior to the foreign article.

A person for many years, as he declares, engaged in the weaving of silk in different establishments in London, having had (as he says) for 15 years from 250 to 300 lbs. of silk, of every grade and name, passing through his hands weekly, expresses the following opinion as to the silk, &c, of our country:

"I am qualified to affirm, from various experiments I have tried, that the silk is superior to any I have seen, from Italy, China, France, Piedmont, or Valencia, where the worms are fed upon multicaulis, or Italian. Its brilliancy, strength, and scent, are superior. I am aware that an exposure to the saline air, in the passage across the ocean, may be the cause of the loss of fragrance to imported silk; but the *brilliancy* is peculiar to American silk, if reeled in a proper manner, with cleanliness.

I am confident that the mammoth sulphur

worm is the pure Fossam brown. To try this, I had about 3 lbs. of silk reeled, and enclosed it in an air-tight box for three weeks. When I took it out, it had the fragrance of the Fossam brown stronger than any that I ever smelt in England, which convinced me that the mammoth sulphur is the identical silk which is always from 5 to 8 shillings per pound higher than ordinary silk.—The mammoth white and the pea-nut white is a Novi, and superior to any I have seen in England. The yellow or orange I cannot, satisfactorily to my own mind, yet define, but am trying experiments in order to ascertain. I am strongly persuaded it is a Bergam. Should this be the case, it will prove a great acquisition to manufacturers of silk velvet. Some have supposed the pea-nut white is the Piedmont, but they are mistaken.—The Piedmont cocoon is lily white, very diminutive, with a sharp point."

Several facts may here be mentioned, which show that the difficulties which have been variously experienced in this pursuit may be obviated and removed.

A method has been suggested, which further operations will prove whether or not it may be relied on as a successful one, in relation to the killing of the chrysalis by means of the air pump. If it succeeds, it will be a most valuable discovery, as it will preserve the fibre of the cocoon from the injury to which it is exposed by the usual processes. At one large establishment the same object has ben effected by means of camphor; and it is said, that when the camphor is properly applied it effectually accomplishes the object, without inflicting the slightest injury on the silk fibre, and at the same time leaves the cocoon in the same state for reeling that it was before the chrysalis was killed. The air pump, however, should it succeed, will be even better than camphor.

Another experiment relates to the retarding the hatching of eggs. This has been tried with success, and the time delayed to as late a period as was desired. It has also lately been discovered that the leaves of the mulberry can be used to advantage for the purpose of manufacturing a good paper; and thus the silk grower may profitably use his after growth of leaves. The question has been one of no little interest among silk growers, how to cultivate the tree to the greatest advantage, so as to escape the dangers of the more cold climates. One person, who has devoted much attention to this subject, gives, as the result of his experiments, his opinion in favor of setting out the trees on dry warm land, in a state of middling fertility, 4 feet by 2 feet, one root in a place; and says that, thus managed, they are fully safe from the dangers of winter, any where between Canada and the Gulf of Mexico. It is important that they be headed down in the spring, as they do not thus form roots. By laying the trees, and leaving them to stand as they grow, many thousand trees are lost. He also affirms that after repeated trials and much reflection and observation, he has found the Chinese method of feeding in the open places, instead of enclosed ones with an artificial temperature, the best one; and that the first third of the season is worth more than the two last thirds for feeding. It may not be improper to quote here the reasons assigned in the convention for anticipating the regular extension of the silk business.

"The regular extension of the silk business is now to be expected and anticipated. 1. It has outlived the disastrous revulsion of 1839. 2. All our agricultural journals are now friendly, and most of them are zealously engaged in promoting it. 3: The political press is every where ready to publish any candid statements on the subject. 4. Unprincipled speculators in trees have all left the field, and the whole silk business has fallen into new and better hands. They did the cause immense mischief. By their operations in 1839, and especially in the wanton destruction of their trees in 1840, they practically proclaimed that mulberry trees have no intrinsic value. It has taken the regular silk growers two or three years to undo the mischief. Yet we have, in a very desirable and encouraging degree, done it. Trees are now appreciated, and some sales made at small prices. From this time the silk business cannot be extended at all, without creating a corresponding demand for trees. 5. The new tariff, by placing this business on a level with other great interests of the country, gives it a passport to the confidence of business men. 6. Our manufacturers, in some cases, are now shaping their business in reference to taking up silk. Others will do the same, as the times shall seem to justify. This aids the growing of silk. 7. The amount of silk made in years past has been rapidly increasing—each year just about doubling upon the preceding year. In all the States where legislative bounties are given, we have the means of showing this increase with great precision. The State Treasurer in Boston gave the following statement, how this matter stands in Massachusetts:

1836	$71 37	1840	1,233 59
1837	198 00	1841	2,111 42
1838	350 52	1842, to Oct. 1	3,351 91
1839	434 62		

In view of these results, secured amid all the multiplied discouragements that we have had to contend with, what may be hoped for, now that we have surmounted these discouragements, and gained public confidence. 8. Another consideration, calculated to urge the business forward, is found in the fact that all our present agricultural staples are now extremely depressed, and are likely to remain so. The market is completely glutted. Our farmers must take up something new, or their sufferings will be prolonged indefinitely. In this crisis, silk comes to their aid. In the production of this article they cannot glut the market for one whole generation, most assuredly."

Without desiring to excite undue expectations, it is a question which deserves serious consideration—Whether much more may not be realized from the prosecution of this business than has hitherto been? The little town of Mansfield, in Connecticut, by a persevering devotion to it, undiscouraged by the ill success of others, has been enabled to derive therefrom a good profit; and it appears from the last census that, with a population of 2,276, not less than $20,000 is annually received from this business.

The bounty paid in Ohio, in 1841, amounted to $2,681 76; in Pennsylvania, $4,418 55. In 1842, there was paid, as bounty in Ohio, $6,699 61. The whole amount of reeled silk produced in Ohio is set down at 3,000 pounds. One person sold 300

pounds of reeled silk for $1,600. The whole aggregate of the silk crop, throughout the United States, for 1842, has been given in our tabular view as 244,124 pounds of cocoons.

It may be proper here to allude to a clerical error in the tabular statement of silk for 1841, in the last year's Report, as relates to the State of Massachusetts. Owing to some mistake in transcribing and reducing the amount of cocoons from bushels to pounds, the amount was set down at 198,432 pounds, instead of 19,843, as it should have been. It was early noticed, and corrected in several of the agricultural papers.

SUGAR.

The sugar crop may be divided into that which is from cane, and that from maple and other sources.

The cane crop is confined almost wholly to Louisiana; and, from the best information we can gather, it is believed to have been, on the whole, as successful the past year as in the previous one, if not more so. The early frost and high winds threatened it, and were thought to have cut off the crop by thousands of hogsheads; the clear, cold weather, however, succeeding, prevented it from proving so injurious as a milder and more moist season would have done. Even the frozen cane turned out very well, and thus nearly realized the full amount of the planters' expectations. The capital employed in the production of sugar is said to be $52,000,000, and the average manufacture is probably more than $80,000,000 pounds, and 4,000,000 gallons of molasses.

The amount of sugar manufactured from the SUGAR MAPLE has also increased during the past year; and from various accounts, in different sections of our country, it promises to be an article of much importance, and, as it can be refined equal to the best West India sugar, it may be exported. In some of the States it has doubled. Many of them possess large resources in this respect. For instance, it is said that there are at least 30,000 acres of land in Michigan which abound with the maple. A maple-sugar tree is considered worth, to the farmer, from two to three dollars for its sugar; and there are, on an average, in the sugar-maple districts, about 30 trees to an acre, which would give at least 900,000 trees, worth $1,800,000—probably $2,000,000. By suffering a portion of these to remain, while clearing up their land, the farmers would be able to derive much profit from them, from year to year.

In some small towns in the New England States, as many as 30 tons have been produced during the past year. Much of this sugar, also, is made at a season of the year when the farmer there cannot be occupied in the tillage of his ground, and the time consumed will amount only to a few weeks each year. Maple-sugar, equal to the best Cuba sugar, is now manufactured in flat pans, and it is capable of being refined, and producing a very fine article.

The beautiful sample of maple-sugar from Vermont, deposited in the Patent-Office by the Hon. S. C. CRAFTS, induced an inquiry into the manufacture of the article; and a reference to Appendix 19 cannot fail to gratify, as well as instruct, those whose curiosity or interest may lead them to investigate the process.

Comparatively little attention is now paid to the sugar-beet, as an article of manufacture into sugar. That it admits of being successfully used for this purpose, no one acquainted with what has been done in France and other countries on the continent of Europe can doubt. The probability is, that it has not been attempted in this country on a sufficiently large scale to render it profitable. Yet large quantities of the beet-root have been raised to the acre. The manufacture of beet-sugar, which has been carried out so largely in France, seems to have greatly declined for a few years past, and will, it is supposed, be broken up, in the desire to sustain her colonies. Not more than 44 manufactories are reported as in operation there, in 1842; and the amount of beet-sugar delivered was only about one-half million pounds. Such, at least, is the account professedly derived from the Report to the French Minister, and published in Paris. The whole aggregate sugar-crop for the United States in 1842, is estimated at 142,445,199 pounds.

CORN-STALK SUGAR.

Numerous experiments have been tried in various parts of the country, the past year, with respect to obtaining sugar from the corn-stalk.

It could, indeed, hardly be expected that persons entering into it without much knowledge of the process of manufacture, and, in many cases, never having been furnished with any plan on which to conduct it, and possessing no requisite machinery, and before the difficulties attending its granulation had been removed, would be successful in their efforts. Yet the results have every where been so satisfactory, that, though but little sugar has been made, not one person from whom we have heard expresses a doubt of its entire practicability, or the least discouragement. On the contrary, they, one and all, confidently assert that the product will yet become a great staple in our country. An excellent molasses, or sirup, has usually been obtained; and were this the only thing secured, yet, in this point of view, it would doubtless prove a great desideratum.

Mr. Webb, of Wilmington, Delaware, to whom the country is so particularly indebted for introducing this discovery to notice, and for his perseverance in demonstrating its practicability, made a definite experiment on a certain amount of land, sown as he had before recommended. Speaking of his former views, he says: "These anticipations have been more and *more confirmed by every succeeding step in the investigation.*" He says, further: "There was no deficiency in the *corn;* it was entirely in our mode of treating it; and, after all, the failure was only in crystalization." It appears that the corn was fully ripe before the least preparation had been made for manufacturing it; and after this, delays were occasioned by breakages, incident to new machinery, by which the progress was so hindered that a considerable part of the crop was killed by the frost before it could be ground. He goes on to observe that the greatest part of the sugar he obtained was from this frost-killed corn, and says: "This fact is important, as it shows the superiority of corn over the cane." In this point it would seem he is mistaken, according to the account above given of the cane crop of Louisiana. He further says: "We obtained 50 gallons of sirup,

which (being boiled to the density of sugar) was much richer and better than the best sugar-house molasses; part of it was sold at $1 per gallon. We also had 10 gallons of sirup evaporated in broad shallow vessels; this crystalized readily, and made good sugar." Again: "Besides the products above mentioned, we obtained from the acre about 40 gallons of vinegar. The fodder was equal in value to two tons of hay; and there were 20 cart loads of stalks, after passing the mill. One-fourth of the crop was lost, in consequence of being prostrated by a storm late in the season, and another fourth from the stalk being imperfectly pressed. Considering every thing, the result is satisfactory." For further particulars of his process of evaporation, reference may be had to Document No. 2. A fair review of the progress of this experiment fully justifies his language: "I do not think that any manufacture ever promised better, in the early stages of its introduction." In the Farmer's Cabinet for January, 1843, a correspondent of that journal, whose opinion seems entitled to consideration, remarks: "Few persons would be apt to calculate the expense attendant on even a small experiment in the making of sugar, whether from the cane, the beet, or the cornstalk; all who know any thing about it, however, are aware of the fact, that the process, even from the first, is proverbially laborious, careful, and expensive."

"Mr. Webb's apparatus cost him about $300. I should rather add 1,000 to that sum. In my own opinion, the cause of the failure in the attempts to make sugar from the beet has arisen from the single circumstance of its never having been taken up on a sufficiently expensive scale. In France, there is no difficulty or delay experienced; but there the machinery is equal to the labor required." The writer also refers to Mr. T. Morgan, of Louisiana, and says "that, according to his experience, the juice of the cornstalk, as stated by the saccharometer, is *two-tenths* stronger than the juice of the Louisiana sugar cane—a circumstance accounted for by the fact that the cane does not fully ripen in Louisiana, so that the juice is incipient."

On the other hand, the corn ripens perfectly, and then affords a juice properly corrected and matured, and hence defecation of it is remarkably easy. He further says: "I have been informed that Mr. Morgan was so well satisfied of the cultivation of the cornstalk, for the purpose of making sugar, that he, the last year, gave orders for the growth of a certain breadth on his sugar plantation, in Louisiana, the past summer, so as to give him a full boiling of juice for his vacuum pan, that the trial might be made on a scale sufficient to produce actual results, by which to calculate, in a pecuniary point of view, the real value of cornstalk in the manufacturing of sugar, but that his intentions were frustrated, levelled to the dust, by a storm, which prostrated the corn, and entirely ruined his prospects. Speaking of some samples of sugar manufactured by Mr. Webb, he says: "It has been objected, that the grains are not so large and fully developed; it is only a wonder that any grains at all should be made to appear, from the manner in which the granulating process had been compelled to be carried on. Mr. Morgan, with his 10,000 gallons of liquor, at 45° would soon be able to give a better account of the matter."

Mr. Blake, of Indianapolis, in Indiana, also tried an experiment on a larger scale; but not having as much previous knowledge of the process as Mr. Webb had, did not succeed in obtaining sugar. He says he made, in all, out of about 4½ acres, about 270 or 180 gallons of thick sirup; 25 *gallons of the juice made* 4 *gallons of this sirup;* and he is well assured that he left in the ground corn one-third of the juice. His corn was planted four feet wide, and drilled one way. He planted about six acres, but a portion of it was prostrated by a storm, and so was not used. He found that wooden cogs and journals for the mill would not answer, and recommends iron-bound and iron-plated, and metal cogs and journals. He had no previous knowledge of sugar-making, of any kind, and of course had to encounter all the difficulties of a learner. For boiling, he used common 15 gallon iron kettles. The great difficulty he found was in arriving at the graining point, in boiling. His plan was to boil the juice of the cornstalk, as soon as the scum was removed, down to a strong sirup, and then put it into a cooler, or large tub, having two or three inch holes, one in a level with the bottom, the others an inch and a half from the bottom, and let it remain to the next day, and then boil it down to the graining point. He says also, "my main object in trying the experiment was to ascertain whether cornstalk contained saccharine sufficient to make it an object to cultivate it hereafter, as one of the great staples of our State. On this point, I am satisfied that, in a few years, it will become an article of export, and of great value to the West."—"My molasses is esteemed, by all who taste it, to be superior to New-Orleans." "From experiments I made when I had got my mill to work well, I could grind 300 gallons of juice in about 18 hours' work, with two horses, allowing one hour for each horse at a time; two boys could attend the mill with ease."

"From the best estimate I can mak eof the cost per acre, in removing the ears, blading, topping and cutting, hauling grinding and boiling, &c., it was between 12 and 15 dollars. Of course, it would have cost much less, if I had been as well organized as I could be, were I to carry on the business upon the same scale hereafter; boys can do most of the work." He also expresses his full intention to go into the business with a view to permanency and profit.

Others also, in Indiana, tried the experiment with various success, and by a communication from Mr. Plummer, of Richmond, in that State, it appears that, in all cases, the success equalled expectations as to the quantity per average acre; but the quality was not so fine as expected, and it was supposed some added more cream of lime than was necessary. The sugar, however, proved equal to about second quality New Orleans. He also remarks, that they found wooden rollers would not answer as well, as they were liable to cut in ridges, and thus much of the saccharine matter was lost. He further suggests, that, by planting the corn some days apart from each other, one mill might serve a number of persons, and thus the expense be lessened. The farmers

there, he adds, as an evidence of their confidence, do not expect to open their sugar trees again.

The conclusion is expressed by several, that from 600 to 1,000 pounds of sugar may easily be procured from an acre.

Another person speaks of obtaining half a gallon of sirup from a bushel and a half of crushed stalks. Mr. Goodrich, of Terre Haute, in Indiana, is also stated to have produced from eight gallons of juice two gallons of molasses, pronounced by competent judges equal to the best sugar-house molasses.

Mr. James T. Gifford, who tried some experiments with the cornstalk, on examination, found that the butt of the stalk remaining in the field retained its juice and saccharine matter until the hard freezing in November caused fermentation to commence, from which time the saccharine matter was too acid. It is also said, that sugar has been made of the water in which the ears of corn have been boiled; from whence it has been inferred that the cob contains much saccharine matter. Mr. Knapp, of Waynesville, Illinois, in a communication made to the Union Agriculturist, for October, published at Chicago, says: "I hasten to say briefly, that I have made about six gallons of maize molasses from what was judged (not measured) a barrel of expressed juice of the stalks. I find there is no difficulty whatever in clarifying the juice with hydrate of lime, skimming until it boils, and then straining through a flannel. An immense quantity of extractive matter in the form of a fawn-colored precipitate is thus speedily got rid of, and the evaporation is then conducted in the same manner as in making maple sugar. There are two other mills in this neighborhood. At one of them, sixty gallons of molasses have been made from an acre. In regard to crystalization, I entertain no scruples, when the evaporation is conducted properly and carried to the proper points." The experiment has been also tried, it is said, in South Carolina, even to granulation, without difficulty, with perfect success; and confidence in its importance as a product is expressed.

In the number of the Albany Cultivator for January, 1843, a correspondent writes from Ohio, and, referring to an experiment of his own, says: "The result of this experiment has led me to the following conclusions:

"1st. That Mr. Webb's statement of the amount of sugar which can be made from an acre is not overrated.

"2d. That stripping the ears from the stalks is essential to the production of sugar, though not essential in the production of a much smaller quantity of excellent molasses.

"3d. That large stalks yield much more juice than small ones in proportion to their size, and that, consequently, the corn should be grown in drills, and not by sowing broadcast.

"4th. That the principal labor in making sugar from cornstalks consists in stripping off the leaves, and that this is most expeditiously accomplished before the stalks are cut.

"5th. That three quarts of juice will yield saccharine matter equal to one pound of sugar; or that eight gallons of juice will make one gallon of thick molasses.

"6th. That the manufacture of sugar from cornstalks is an object well worthy the attention of every family who has even one acre of ground to cultivate."

Such are some of the results of very imperfect experiments the first year after the announcement of the fact that sugar can be made from the cornstalk. They were commenced and prosecuted, in most cases, with the simple view of deciding a question on which, probably, nearly all who had just learned that such a thing was asserted, were, to say the least, somewhat skeptical. They, too, had no conveniences for the manufacture; and yet, with all these drawbacks to success, the question may be considered as fairly settled by a number of independent witnesses who need only a knowledge of the process, and skill and experience in conducting the trial hereafter, to insure complete success. In order to aid in this desirable object, and as so many are interested in whatever may throw light on the subject, Mr. Webb's account, originally drawn up for the National Agricultural Society, will be subjoined in Document No. 3.

As numerous inquiries also have been made respecting the best process of clarification, a communication detailing the mode has been obtained from Professor Mapes, of New-York, who has paid much attention to the subject, which will be found in Document No. 4. He, also, as will be perceived, expresses his conviction, from some experiments on the cornstalk, of its entire superiority over the sugar cane, if the enthusiasm of those who made the former experiments published did not lead them into errors.

The French scientific journals contain some notice of this subject, and a belief is there expressed that sugar can be manufactured from the cornstalk and from the *fig cactus* found in the recent French possessions in Africa.

There are some facts stated in relation to the manufacture of sugar from the cornstalk, it is thought proper to subjoin. They have been mostly derived from Porter's Treatise on the Culture of the Cane. At 10° of Beaumè's saccharometer, it is said, there are in 100 lbs. of cane juice or sirup 18 lbs. 6 oz. and 1 dr. of sugar.—This, it will be perceived, is not more, if as much, as Mr. Knapp and others obtained from the cornstalk. The weight of water, beside what is termed the water of solution, to be evaporated to reduce the cane juice to a state of saturated solution, is 70 lbs. 9 oz. 6 dr. A saturated solution of cane juice contains five parts of sugar and three parts of water. This is indicated by 34° of Beaumè at the temperature of 82 Farenheit.—Seventeen ounces of lime are used for 390 gallons of cane juice. The greatest danger seems to be of using too large a proportion of alkali.—The highest produce of 100 gallons of cane juice for nine years average, on an acre of an estate selected in Jamaica, is stated to have been 122 lbs. of sugar. The experiments above cited, with respect to cornstalk, would show an equal, if not a greater average. It is evident, that the whole difficulty of granulation may be obviated by boiling immediately and quickly in not too large quantities. The paper of Professor Mapes, in the a Document, lready referred to, will also furnish valuable information on this point. The

Southern States, who have heretofore been engaged in the manufacture of cane sugar, possess peculiar advantages in this respect, as they are already provided with the requisite machinery for grinding and boiling, and can apply their already acquired skill, no doubt with great effect. Hence, we need not be surprised, if we should hereafter find them taking the lead in this business. It is a truly gratifying reflection, that, while the temperance reformation is so greatly lessening the consumption of corn in the manufacture of whiskey, the introduction of this manufacture of cornstalksugar promises to furnish a much more profitable as well as salutary application.

WINE.

As this product was set down in the table of the last report, based on the census statistics, it has been retained. It is believed, however, that no material alteration has occurred, as there is little to occasion any advance, and, probably, some causes on the other hand to discourage it. The cultivation of the grape, however, is still successfully continued, and several indigenous species have been tried and approved. The whole wine crop for 1842 is estimated at 130,748 gallons.

AGGREGATE CROP FOR 1842.

The entire aggregate of the crop for 1842 thus appears to be very great. Although lessened in some States, yet the amount of the whole is much increased. The estimates might have been larger but the aim has been to *fall short* rather than *exceed* the truth. Very many interesting deduetions and comparisons might be made in reference to the individual States and the proportions of particular products raised to the populatian ; but these must be left to each one to form for himself from the data furnished in the tabular estimate.

The amount of breadstuffs, including corn and potatoes, is 716,147,950 bushels. This allows for each man, woman, and child, of our whole population nearly 39 bushels ; or, should we estimate the quantity for each individual according to the usual allowance in England, the surplus product would be very great.

It should be recollected, also, that the mere breadstuffs and potatoes form by no means the whole amount of surplus food, as the last census shows a vast amount of other articles of this description.

OTHER PRODUCTS NOT EMBRACED IN THE TABLE.

It may be well here, also, to allude to certain products not mentioned in the tabular estimate, which have been sometimes proposed as offering some encouragement to the agriculturist to engage in raising them, and thus add to the means of employing the labor which must be given to agriculture, and which yet, owing to the vast surplus of the grains, &c, above the home consumption, seems to promise but little profit.

One of these is BROOMCORN, which is much cultivated (and with success) in some towns on the Connecticut river, in Massachusetts. The amount produced on one acre varies from 800 to 1,000 lbs., besides 60 or 70 bushels of seed. The brush is said to be worth 4 or 5 cents per lb. ; in 1837, it was worth 12½ cents per lb. The seed on an acre, at 33 cents a bushel, is said to be equal to a crop of oats. In Northampton and its vicinity, not less than 1,300 acres are thus cultivated, worth, for the brush and seed, $100,000. The seed usually weighs 40 lbs. per bushel. The manufacture of brooms in a small town (Hadley) in Massachusetts, is estimated at $160,000 ; 80,000 brooms were manufactured by one man in a year. To a limited extent, this eulture of the broomcorn and its manufacture might be yet more extensively engaged in with advantage. The process of cultivation is similar to that of maize or Indian corn. Further details are given in Appendix, No. 5.

Another article towards which attention may be turned is MADDER, of which it is said 5,000 tons are annually imported. This, however, being a plant of three years' growth before any advantage can be obtained from it, is not likely to engage much the attention of agriculturists.

The SAFFLOWER and SAFFRON, which have, perhaps, been confounded by many persons, are other articles of the dyestuffs which have sometimes been suggested as objects worthy of attention. The first of these yields a rich pink dye ; but, for various reasons, it can hardly be much of an object to our farmers. Owing to its high price, the demand for saffron is much more than for the safflowers.

The *rhus cotinus*, or SUMACH, has also been recommended. Many thousand tons of this product are annually imported from Trieste. It is a perennial plant, and it is said might yield two crops in a year ; and it is supposed that, as it bears a strong resemblance in many respects to the sumach indigenous with us, it would succeed and be profitable.

The crops of the various roots of peas, beans, &c, for animals as well as for vegetables for the table, are increasing. A new addition to these has been suggested in the HOG-ROOT, a species of the arum, and possessed of much nutritious matter, of which swine espeeially are particulaly fond. Among other recommendations, have been mentioned its great productiveness, and that it is indigenous, being very abundant, especially in Virginia.

CRANBERRIES abound in vast quantities in the moist prairies in Michigan and some of the Western States. By means of a newly-invented rake, very simple in its construetion and not expensive, 40 bushels may be gathered by one man in a day ; and a cargo of 1,500 bushels have been sent to one of the Atlantic States, from the northern part of Indiana, in a flat-boat, at one time. The price which this product often eommands in the markets of the eities along the Atlantic varies from $1 50 even up to $2 50 or $3 50 per bushel. They can be gathered at the West at an expense of not more than 50 cents per bushel. The duty on them in England is not more than 2 cents per gallon by direct trade. They may also be made to produce largely by cultivation. Sir Joseph Banks is said to have raised them at the rate of 460 bushels by the aere.

GINSENG is an indigenous product, and it is raised in lange quantities at the West. This is an important article of export to China, and the amount sent out to that country within the last 12 or 15 months is said to be upwards of a million of dollars in value.

To the same country, also, now becoming particularly important to us by the additional facilities of commercial intercourse, large quantities of LEAD are also shipped; 100,000 pigs, weighing 3,000 tons, valued at $250,000, were sent there, from the West, in the year 1842. This, besides being a western product, is so intimately connected with the question of diversion from agricultural labor, that the mention of it in this place does not seem improper.

A new method of preserving EGGS, by packing them in salt with the small end downwards, and by which they have been kept perfectly good for 8 or 9 months, will, it is believed, enable the inhabitants of portions of our country where these abound to make them profitable. Thousands of bushels may be sent off to the Atlantic markets. Great quantities are used in France; and as the duty on them in England is so low, (not two cents per dozen,) they might bear exportation. They have been gathered and sold at the West as low as 90 cents per bushel; which, as a bushel contains 45 dozen, is but 2 cents per dozen.

From present experiments, the introduction and raising of SHEEP on the vast prairies of the West are to be anticipated, and it would not be surprising if there should be a great change in the territory to which the consumers of wool must look for much of their raw material. Hitherto, the New England and Middle States have principally furnished the market with wool. But sheep are already beginning to acquire importance in the view of the farmers and planters of the West and South; and if the importation of 1,100 merino bucks in a single year into South America produced such a change in their flocks, why may not equally as striking a result be effected in the Western and Southern States by a similar introduction there? Millions of sheep could be sustained at little expense on the belt of the oak timber land running through Georgia, 70 miles wide by 150 miles long. Indeed, there is scarcely one of the Southern States but would furnish some good section for the keeping of flocks on the uplands. Planters are now also actually beginning to collect their flocks. The sheep-raising States of the North must expect competition. The farmer in the higher and colder latitudes, who has to fodder his flock for a long winter, will certainly feel the effect of this new direction of sheep husbandry, brought, as he will be, into competition with those who enjoy the advantage of an almost perennial spring. So soon as the planter ceases to be absorbed in the production of cotton, the streams of the South will be lined with mills, and various operations of machinery. The Northern and Middle States cannot but see that it will do so. There are many locations south and west of the Delaware where three sheep at least can be kept as cheap as one can on the confines of the Canadas.

Pasturage to almost any extent covers the prairie range, and grass and grain for a short winter's feed are cut and reaped by machines at a trifling expense. One gentleman, it is stated, in the vicinity of Buffalo, New York, having a prairie farm in Illinois of some 500 acres, purchased 2,000 sheep, which he placed upon it, under the care of two faithful shepherds. The sheep were kept without difficulty in the best of health, and the proprietor, as the first fruits of his enterprise, received 6,000 pounds of good wool worth 30 cents per pound. The transportation from Illinois to Buffalo cost about one cent per pound. These facts are mentioned, not to discourage effort but to prepare the producer of wool to meet the condition of things that must soon take place in a state of general peace and depression of price of all the staple products. By the last census, it appears that there are in the United States about twenty millions of sheep. It has been thought by those who have paid attention to this subject that this number is much too low; and the supposition has been made that there are not less than thirty-four millions of sheep in this whole country, of which one-fifth are in New-York. The safer estimate would probably be about twenty-five millions; the estimated value of which, at $2 per head, would give $50,000,000. Three sheep is the general allowance per acre for winter provender and summer pasture. The aggregate quantity of land necessary is more than 8,330000 acres; which, at the average of $15 per acre, (perhaps it would reach even to $20,) would be nearly $125,000,000.— The amount of wool produced at an average of 2 pounds the fleece is 50,000,000 pounds, which probably, at the lowest average price, is equal to $12,000,000. It will thus be seen that this object is one of no little importance, and that, therefore, it deserves a place while suggesting diversions of labor which may be anticipated.

Another product connected with the clearing up of lands by new settlers is that of POT or PEARL ashes. The latter of these can be prepared for the market very easily in the form of black salts, and at little expense. These are said to find a ready sale. Potashes, also, may be produced, though it requires a somewhat larger expense of capital. Five hundred pounds of pot or pearl ashes for one acre of good timber is said to be a very safe calculation, and this sells at $25. Every 400 bushels of ashes carefully saved will produce a ton of pot or pearl ashes, into which they can be turned in 36 hours. For some further details of this subject, reference may be made to Documents Nos. 6 and 7. It appears that 2,437 casks of ashes from one port were exported in 1842, valued at $48,740.

The tabular statement contains no columns devoted, as in the report for 1841, to the domestic animals, the produce of the dairy, orchard, and horticulture; but it is evident, from all the information which has come under the notice, that these are also steadily advancing. Agriculture is yet destined to experience a great impulse from the new light which is just breaking in upon the farmer, as respects the composition of soils, manures, &c. An agricultural literature is forming of a most important character; and, by the revolution in the mode of publishing books, it may be expected that ere long our farmers in the remotest parts of the country may feel the effect of such a diffusion of combined scientific and practical knowledge. Liebig, Daubeny, and Johnstone's works, and others, which have recently been brought before the public, contain much information on the important subjects of analysis and adaptation, and the effect of various kinds of cultivation and enriching of the soil. And here too, it may not be improper to mention another

work, in itself a treasury of knowledge in agriculture and every thing kindred to it—London's Encyclopædia of Agriculture. Perhaps it would not be too much to predict that, in the course of years, an entire change will be wrought in the mode of applying manures. The wonderful skill of the Chinese in improving their soil, not so good as most parts of our own naturally, by which they are enabled, as it is now well ascertained, to support a population of more than 300,000,000 throughout their vast empire, is owing to their wisdom and care in adapting their manures and modes of cultivation to the peculiarities required by the soil. As they separate its enriching elements, rejecting the parts that can have no effect, they are not constantly exposed to a new growth of weeds, and the seeds of which are sown among the loads of compost had other manures carried out into the field. Hence a weed is a rare thing in their fields, and as soon as it makes its appearance is easily seen and eradicated. The time is not far distant when the ammonias, silicate of potash, phosphates, &c, which render a particular manure valuable, will be prepared and used in the form of salts, or in a liquid form, sprinkled over the soil, instead of whole loads being carted out from the barn yard and compost heap for this purpose. It needs only the diffusion of such knowledge, and the successful trial by some of our most intelligent and practical farmers and planters, to overcome the prejudice against changes like these, which would do so much to benefit our agriculture. As an evidence of this fact, it may be mentioned that many acres of worn-out lands in Virginia have been recovered by the skill and toil of enterprising farmers from New England and New York, so that farms under this culture in many instances have been doubled, and even tripled in value.

It is gratifying also to observe that the attention of the State Legislatures are more and more turned to the subject of agriculture.

The State of New-York, by a law passed May 5, 1841, appropriated $8,000 per annum, for five years, for the encouragement of agriculture and household manufactures, to be divided between the county societies, which raise a certain sum of money for the same purposes. Had a longer time been permitted before the transmission of the report to Congress recourse might have been had to the valuable report of the New-York State Agricultural Society, which is yearly required by the provisions of the State law.

LARD OIL, ETC.

The subject of the manufacture of OIL from CORN and LARD was introduced to the notice of the public in the report of last year. As corn oil has heretofore been connected with distillation, although it is easily made and answers a good purpose, less attention has been devoted to it. It has been suggested, on good authority, that it can be gathered from the mash which is prepared for fermentation for feeding swine. If this should be confirmed by further experiments, as it would not be liable to the same objection urged against the former, the manufacture of spirituous liquors, it may hereafter be carried on to a great extent. No doubt seems to be entertained of its value for burning, and all other purposes to which oil is applied but painting.

Much interest has been felt in the subject of oil from lard, and the almost daily inquiries respecting its process of manufacture, &c, and its close connexion with the question of disposing of our agricultural products, forms a reason for giving it a more extended consideration in these remarks. Complete success has attended the enterprise.—Several large factories for the manufacture of this oil have been some time in operation in Cincinnati, and thousands of gallons are daily prepared for home consumption and exportation. It is also carried on at Cleveland, Ohio; Chicago, Illinois; Burlington, Iowa; Hannibal, Missouri; and other places both in the Western and the Atlantic States.

It is considered much superior to olive or sperm oil for machinery and for the manufacture of woolens, &c. It can be furnished also at half the price, and therefore it will doubtless supersede that article of import. As it contains less gelatine than other oils it is found much better for combing wool, for which purpose a single factory wished to contract for 10,000 gallons from one establishment. It is also undergoing trial in England; and, if it succeeds, of which there can scarcely be a doubt, large orders for it may be expected, or at least the American lard itself, which pays a less duty, will find a ready market. An order for 600 gallons, with this view, has already been received for the use of a cloth factory in Huddersfield, England. It has also been stated in the journals, that a gentleman is about taking out a large quantity, recently ordered from the West, for the purpose of trying it there as an article of trade, and it has lately been stated that 16,000 bbls. have been sent from Cincinnati to England. Repeated experiments, too, have shown that for the purpose of combustion no oil is superior. It is important, in trying it with this view, to obtain a good article, manufactured from good lard, and not from the dark-burned which creates smoke and clogs the flame. For want of sufficient care in this respect, some have no doubt met with disappointment in their attempts to substitute this oil for sperm oil in the lamps.

The following are given as the relative constituents of lard oil and sperm oil, in 100 parts of either:

	Carbon.	*Hydrogen.*	*Oxygen.*
Lard oil.....	79.03	11.422	9.548
Sperm Oil.....	79.05	11.6	8.9

It will thus be seen that the difference in carbon is only 3.00; about the same in hydrogen; while in oxygen it is about 4.10 in favor of the lard oil. The large quantity of carbon proves that it may be relied on as a material for giving light, as it is well ascertained that whenever carbon predominates in an animal oil the article capable of a high degree of luminous power. Experiments have been made by Mr. Campbell Morfit, of Philadelphia, which may be found mentioned in the paper furnished by him in Document No. 8. These resulted in favor of lard oil. About 60 lbs. in 100 of good lard, in tallow only 28 is oil; and the processes of manufacture resorted to, show that it may be made a profitable business.—Large orders have already been executed at the West for this oil, to be used in the Eastern States.

The heat of lard oil for the blow pipe has been found to be much greater than that of sperm.—Lard itself melts at 82° of Farenheat; its specific gravity at 60° is 0.938. Lard crystalizes in small globules; sperm in flakes or scales. It is soluble in boiling alcohol. The proportion is 80 gallons of lard to 1 of alcohol. The application of stearin for candles, which was also alluded to in the last year's report, promises greatly to reduce the price of that article, as will be seen by Mr. Morfit's letter, already alluded to in the Document No. 8. He thinks that the price of such candles, equal to spermaceti, may be eventually reduced to 12½ cents per pound.

As the capillary attraction of lard oil is not so great as that of sperm, it is recommended that the form of the lamp should be such as to bring the bulk of the oil as near to the point of combustion as possible.

It is also recommended, that the tube should be filed thinner at the top where the wick is inserted to prevent the escape of heat. Various lamps have been constructed for burning lard as well as lard oil, which have been found to answer very well. The solar astral lamp, for this purpose, affords a light unsurpassed by any other for brilliancy and quality of luminous power: and the letter of Mr. Milford, Collector of Cleveland, Ohio, (Document No. 9,) shows that the burning of this oil has been introduced with entire success into the light-houses on Lake Erie. An objection has been made against lard oil, that it is not capable of being preserved in a liquid state in cold weather; but by a process similar to that by which the winter sperm is prepared, lard oil can be made which will not chill at 30° Farenheit.

The importance of this application of lard can scarcely yet be realized. Vast quantities of the oil can be manufactured at the West. Indeed, there is hardly any assignable limit to the power of production of the article, so that, while the demand continues, the business may be conducted profitably. The immense herds of swine, which can be suffered to range over the lands adapted to them, and gather their food from mast as well as the surplus of corn, wheat, potatoes, &c, on which they may be sustained, admit of the manufacture being carried on to almost any extent.

The proportion of lard to the whole hog is about 60 per cent., after taking out the hams and shoulders, or taking out the hams only; the estimate for hogs of the best breeds, and so fed as to produce the greatest quantity of fat, is 70 per cent. As the object is not in this case to make pork for food, the objection against those species of nuts, and other modes of feeding which render the animal more gross and oily, is obviated; and it has been proposed to feed out oil cake to swine, to increase the proportion of oil.

An important letter, in relation to the manufacture of lard oil, &c, will be found, together with Mr. Morfit's account, before mentioned, in the Documents Nos. 8 and 10, the necessity of the publication of which is every day becoming more and more apparent from the continual demand on the Patent Office for copies of the mode of extracting the oil from lard. The specification of one manufacturer, who has patented his process, has also been added for the same reason, as numerous copies are continually requested. (Document 11.)

By a new process of steaming, (a very simple method, a description of which will be found in the letter of Mr. Stafford, before mentioned, in Document No. 10, (it appears that the whole of the lard or oily matter in the hog, or of tallow in cattle, may be obtained; while the danger of burning (common in other modes) is avoided, the consumption of fuel lessened, and the degree of pressure required not so great as otherwise. It will be recollected that, while conducting the manufacture of lard, the other parts of the animal, as the hams and shoulders, may be turned to profit. Besides these, also, the hides may be tanned by a cheap process; and the bones, which are worth half a cent per pound, may be calcined and made into animal carbon, for which they are said to be worth, in this calcined state, two and a half cents per pound.

Oil is likewise made of the SUNFLOWER—35 gallons to an acre. The cultivation of the CASTOR BEAN continues to be carried on with increasing success for the manufacture of castor oil, which may also be turned into stearin and oil for burning. A single firm in St. Louis has worked up 18,500 bushels of beans in four months, producing 17,750 gallons of oil, and it is stated that 800 barrels have been sold at $50 the barrel. This oil, likewise, admits of being prepared for machinery, soap, &c., and it is much more soluble in alcohol than lard. A new experiment, too, as to the introduction of RAPE SEED, for the same purpose, promises much success, as it is found that rich ground will produce from 25 to 40 bushels to the acre. Ten quarts of oil may be obtained from a bushel of the seed. Oil cake is worth, per bushel, about the same as oats. This oil sells for from 75 cents to $1 the gallon. For further details, as to this experiment, reference may be made to the letter of the Postmaster at Erie, Pennsylvania—Document No. 12.

A more beautiful article of lard is now also manufactured, which is of the purest white, and much harder than the ordinary kind, and which thus possesses additional advantages for exportation, as it will bear being sent to the warmer climates, and can be prepared by a rapid process which costs not over half a cent the pound. The details of this will be found in Mr. Stafford's letter previously referred to in Document No. 10.

These various articles just mentioned, have been brought together, as they are of a kindred character, and constitute a branch of business which is probably destined to become a most important one in our country. It may be well, indeed, to look at this subject a little more closely, and in detail to ascertain the means we have of future production, as this lard is one of the articles on which the duty in England and France are so low as to bear exportation. In the first place: What are the materials of manufacture at home? The live animals can be raised at little comparative expense; and this business, as we have before said, can be carried on to almost any extent.

Few persons, who have not taken the trouble of calculation, are aware of the results of an examination into this subject. It would be thought strange, were the assertion made, that the export of oil, pork, and lard, were a market opened to us, might be equal to that of our heaviest staples—even to that of cotton; but it is believed that

it can be strictly demonstrated that not only this is true, but that it might reach in value beyond all the exports from this country the past year. The calculation is an easy one: Pork can be raised in all the States; and wherever there exists mast and wild vegetable roots, the expense is very trifling; for, it will be remarked, that, for the purpose of making oil, it is immaterial how great is the degree of oleaginous food, which is given to swine. Beech, oak, hickory, and walnut, all furnish excellent food. Corn, too, may be raised on the prairies at $3 per acre, standing in the field, where the swine are turned in to feed; making the cost six cents per bushel—allowing (which is a fair estimate) 50 bushels to the acre. If any one doubt the practicability of this, it will only be necessary to consider the fact, that one man can attend to 40 acres, which, beginning early in the season, he can plough with horses at the rate of two acres per day, plant with the corn-planter from five to ten acres a day, and then till it with the cultivator. At $3 per acre, the supposition before mentioned, this would make his receipt for the three and a half or four months employed,$120 or $30 to$ 35 a month, for wages, expenses, &c. As a further means of keeping the swine, rye may be sown on the ploughed sod to furnish winter food; and by taking them off in the spring, a crop of rye may be raised, making a good sustenance for the swine—they being turned in to feed upon it standing after it is ripe. It has likewise been found that, since the animals scatter some of the grain on the field, the same piece of ground will yield two or three seasons without any extra ploughing. It may also be remarked, in passing, that rye pastures are found to be excellent for wintering cattle without injury to the crop of grain, if the stock is taken off early in the spring.

Such, then, are the facilities for raising swine. We can, however, carry the calculation further. The number of swine reported in the census for 1839 is over 26,300,000. There is reason to believe that the number has very greatly increased in many of the Western States since hat time.—Thus, it is stated, that, in Michigan, in 1837, when the State census was taken, the number of hogs reported was 109,096; in 1839, by the United States census, was reported the number 342,920 being an increase in only two years of 232,535, or more than 100,000 in a year. It is supposed, by a writer who appears to be well acquainted with the products of that State, that in 1841 there were not less than 700,000 swine in the State; according to which ratio there would probably be now over 1,000,000. The whole number in the United States, therefore, estimated simply at an increase of five per cent. the year, would now exceed 30,000,000. Taking this, therefore, as a fair estimate, and allowing that one-half of them should be fatted to average 300 lbs., and for the purpose of lard they would need to weigh 300 or 400 lbs., we should have the following results, viz: 15,000,000 hogs weighing 4,500,000,000 lbs. Deducting the two hams, which might be estimated at 20 lbs. each, allowing also a loss of one-third in curing, is equal to 400,000,000 lbs., and trying up the remainder, equal to 39,000,000 lbs., on which 60 per cent. of lard might be obtained, gives 2,340,000,000 lbs. of lard; and since 8 lbs. of lard equals a gallon of oil and stearin combined, this amounts to 292,500,000 gallons, which is equal to 9,285,714 barrels. This is more than twenty-five times the amount of sperm and whale oil annually brought into the United States, including also palm and olive oils. Allowing 40 lbs. for the two hams, as we have seen, gives 400,000,000 lbs. Estimating now the lard oil and stearin combined at 50 cents per gallon and the hams at 6 cents per lb., we have the enormous sum total of $170,250,000.—This would probably equal over three times the export value of cotton at the present low price or perhaps even the whole crop for this year; as the whole crop for 1842, according to the best estimate which a careful examination enables us to make, amounts to 683,333,231 lbs., which, at 6½ cents per lb., is 44,416,650. This, too, is nearly double the whole value of our exports, as appears from the report of the Secretary of the Treasury.

It is, indeed, admitted that we have not, and probably may not for a long time, if ever, have so large a quantity of lard and hams for exportation; but the supposition is only made to show the capabilities of the country in this respect. There is not the slightest difficulty, were the effort made, in doubling the number of swine in the United States, so that the whole surplus above the present number could be thus used for the manufacture of lard and oil. Besides the articles mentioned in the case supposed above do not require salt, and may be preserved with great ease, as well as allow the animals to be killed earlier, so as to secure a full market; and the former is a consideration of no small importance, especially in portions of the country where salt is high. It will be found more profitable at present, at the price of lard and oil abroad, to use the whole hog for this purpose, the hams and sides excepted. It should be mentioned, too, here, that in the above calculation no account has been taken of a variety of articles which are worth something, and which might aid to defray the expense of the preparation of the lard and hams. Thus, as to the hides, they may be taken off with the hair at about the same expense as by scalding, and may be tanned at $5 per dozen, or preserved by sprinkling the fresh hides, spread out smooth, with salt, laying one over another, flesh sides together, until there are fifty or sixty together. They can then remain in this state until cured, and may be rolled up and transported to any market. The leather of these hides, when tanned, is used not only for saddles, collars, trunks, but also for binding books—a substitute for Russia leather—and many other purposes. The bristles will pay in part for preparing the hides for the market. Hides, when well curried, will bring, it is said, from $15 to $50 per dozen. Hams, too, are said to be better when cured without skins, as the gum of the skin injures the taste of the meat and retards the salting operation.

It may be remarked here, also, that a demand for oil and candles from lard will, of course greatly advance the price of pork for consumption, and thus, while a new staple is created, an old one is greatly improved. An increase of only one cent per pound on swine slaughtered in the United States will make an aggregate in value of at least $30,000,000. This sum would not, in-

deed, actually be realized in cash, as little pork, comparatively, is now sent to market, but is consumed by the family where it is raised. *That country which produces beef and pork to most advantage, and especially if wheat is also added, must excel in agricultural profits.*

FOREIGN MARKET.

In looking at the details just given, evidently proving the immense resources our country possesses in these products, as they may properly be termed, of her soil, the question naturally arises: Is there any demand for them abroad? It can be shown, it is believed, that this demand is greater than has been supposed, and that it seems likely to increase. A part of the bearings of this subject will be brought up in connexion with another portion of these remarks; but it may be well here to observe that from New Orleans the export of lard for the year 1841 and 1842 to foreign ports was 172,260 kegs, while that to the ports of the United States was over 260,000 kegs.

To Cuba, whose exports to the United States have much exceeded her imports from this country, as appears from the report of the commercial relations of the United States by the Secretary of State, there were shipped, during the year 1838, 5,884,028 lbs., valued at $368,146, at a duty of four cents per lb. The desire to obtain lard from abroad has induced England to admit it into her ports at less than half a cent per lb. duty when taken in American vessels, or when taken through the Canadas at less than one-eighth of one cent. per pound. The duty in France is a little more than two cents per pound, to her colonies not more than one half a cent per pound; when sent to the Netherlands and Belgium, one mill per pound; in Texas it is free; in Venezuela, four cents per pound. Large quantities of the olive oil, for which lard can be substituted, are used for making soap. In Marseilles, it is stated, on good authority, that not less than 17,000 lbs. are thus used daily.

IMPROVED MODE OF FENCING.

While the cultivation of timber land will be hastened by the new method, heretofore described, of making pot and pearl ashes, where the preservation of wood is not an object of interest, an improved mode of fencing the prairies gives great facilities for converting what has been hitherto deemed almost waste land to immediate use; and when it is considered that, as appears by an estimate made at the Land Office, there are in four States and two Territories, 39,000,000 of acres of prairie lands, viz: in Illinois 11,000,000 acres, in Indiana 5,000,000, in Missouri 9,000,000, in Arkansas 4,000,000, in Wisconsin and Iowa, restricted to surveyed lands alone, each, 5,000,000 acres, some of which are quite remote from timber, it must be matter of congratulation, especially to those States, as also to the United States, still holding portions, to know that such lands can now be enclosed with one-fourth the expense of a Virginia fence. Where a section of 640 acres is enclosed, it may be done at a cost not exceeding forty cents per acre, where the labor and materials are all purchased. The fence now recommended is composed of a ditch and embankment of three feet high, or a fence three feet high on the top of the embankment. The hedge fence so much commended in Europe, will not answer for the prairies, as the weeds grow up with the hedge, and thus furnish much fuel to consume the hedge in its earlier growth, or even in its more matured condition; and this will be the case until general cultivation protects the prairie from annual fires. The ditch, too, of itself alone, is a poor defence against the effect of frost, and the attacks of cattle. A combination of the two seems to offer all the advantages of both, as the soil is drained by the ditch, and the same forms in part the fence, thus saving much timber.

It requires 26,500 rails to enclose a section of land with the Virginia panel equal to 8 rails, stake and rider, whereas, it takes only 3 rails for a panel on the plan of the ditch and embankment; nor is this all, the rails on the embankment need not be over one-half the size of those in a Virginia or worm fence. The great saving will be apparent when we reflect that four panels of Virginia fence are equal in distance only to three panels of fence made straight. Three rails on the embankment are sufficient. Hence, nine rails on the latter plan are equal to forty on the former one; and when the difference in the size are taken into consideration, the proportion will not be over four and a half to forty, making a saving in timber, carting and hauling, &c, almost incredible. In the success of such a plan, the United States are deeply interested; for it must add millions of dollars to the Treasury, besides enhancing the value of land now likely to remain a long time without improvement, and saving from destruction the vast quantities of timber which the enclosure of the prairie in the ordinary mode of fencing would require. This plan, having been made the subject of great attention, and found to answer the purpose, can be safely recommended. The machinery to accomplish all this as described will not exceed $10, and may be constructed by ordinary workmen. Drawings of the plough and scraper, and the machinery of its construction, with a description in full of the manner of making the fence, will be found in Document No. 13. A model, also, of full size, of both the fence as standing and the various machinery, may be seen at the Patent Office. A letter from a gentleman at the West, (see Document No. 14,) fully sustains the above opinion of its practicability.

MODE OF CONSTRUCTING HOUSES.

Another improvement relating to a cheap mode of constructing houses where timber is scarce, which shall be at once durable and comfortable, as it has a most important bearing on the vast unoccupied lands of the several States and the nation, may not be inappropriately mentioned. Its full advantages may be appreciated by an examination of the plan, which will be found in a detailed statement, for which see Document No. 15. Many who have been made acquainted with this method have deemed it most desirable to have it published for the benefit of the country at large.

RAILROADS.

Connected with this general subject likewise, an allusion may be here made to a plan of constructing cheap rails with a wooden track for horses.—Although it has not been practicable to obtain the details in season for this report, yet it may be men-

tioned that, according to an account published in the various journals of the country, and which appears to be entitled to credit, a railroad of seventy-six miles has recently been undertaken, between the Ocmulgee and Flint rivers, by associated labor, under the direction of Gen. A. H. Brisbane, of Georgia, at a cost, besides the labor of the association, of not more than $15,000, and with a force of only one hundred and fifty men. There seems reason to believe that this plan might be adopted to great advantage in many other parts of the country, and modes of communication opened to all the advantages of the market, with a comparatively small expense. The travel on such roads may be usually at the rate of about ten miles an hour, and the materials for the construction and repair of these wooden tracks may be easily at command.

An improvement of railroad cars has been suggested by Mr. Grant, having one wheel fast on the axis, and permitting the other to revolve. This plan, with three axles connected by a moveable joint, will enable the car to turn on a very short curve, with very little abrasion. For the track, the grading might be done with the scraper adopted for making fence, described above. The track might be made of wood, simply by imbedding cross-ties every few feet, and laying timber, squared on two sides, only adding on the top a ribbon of hard wood, 3 by 4 inches. Horse power can be applied to great advantage, as the friction is but little on this track, compared with ordinary roads. Upon this plan, with moderately undulating ground, no grading need be made.—Places for turn-outs are made as usual; and where travelers wish to stop for the night, a platform of smooth boards is provided. This track is made seven feet wide, to accommodate farmers in the transportation of produce. A model track may be seen at the Patent Office.

FUTURE SURPLUS.

From the foregoing remarks respecting the crops, &c, it will be seen that we have already a vast undisposed surplus of products above our home consumption, and the resources of the country, in the soil and means of production, are almost beyond limitation. Yet there is reason to believe that this surplus will be larger in future years. To specify, in brief, some of the causes which render this probable:

1. Increase of population, by natural increase and by emigration from foreign countries. Probably not less than one hundred thousand emigrants yearly leave the shores of Europe, who find their way into the United States. It is true that some of the poorest of these, who have no means of paying the expense of travel into the interior, have been forced, for want of occupation, to return; but by far the greater number continue in this country. Even during the winter months many are arriving, by the way of New Orleans, which port affords peculiar facilities, while the more northern routes to the west, by the canals and lakes, are closed. Thus, in a late paper, we find the following notice: "There arrived at St. Louis, on the 8th and 9th inst., 1,417 passengers, principally English and German." Recent mention has likewise been made of a large projected emigration from England and Ireland, and from parts of Germany, which may lead us to anticipate a very considerable increase to the usual annual number.

2. The introduction of labor-saving machines for sowing, reaping, threshing, &c. The increase from this cause is large, and may be expected to become yet more so. It has been estimated that Great Britain employs steam alone for the purpose of effecting what formerly depended on other power equal to 500,000,000 men, which is as many as one-half of the population of the whole globe.

3. The facilities for enclosing the prairies at a moderate expense, and of constructing cottages at a much less expense. Multitudes will thus, no doubt, be called out into action, and millions of acres of land be brought under tillage, and, rich as they are in soil and ease of cultivation, the increase of the annual crop will be very large. Where the laborer can be comfortably lodged and sheltered, his effective strength is put forth with more vigor, and the inducements to employ his energies are far greater.

4. The encouragement to fell the forest, and clear up lands by converting the growth into pot and pearl-ashes, as well as to raise corn, &c, for the purposes of manufacturing sugar, the preparation of pork, lard, &c, for the market.

5. The withdrawal of laborers from public works which have been stayed in their progress by the indebtedness of the States, and the failure of those engaged in prosecuting them. If the plan of railroads by associated labor, above mentioned, shall be found to answer the purpose, this cause may not, perhaps, exercise so great an influence in lessening the quantity of products raised.

6. The poor encouragement in trade, and the appalling number of failures among men of business in the commercial cities, &c, will doubtless throw out a vast number of consumers of various descriptions into the class of laborers and producers of agricultural products.

These principal causes, together with others of less influence which might be added, will probably contribute to increase the number of tillers of the soil, while every additional laborer from a consumer becomes likewise a producer to no small amount.

COMPARISON OF EXPORTS AND IMPORTS.

While the present surplus of agricultural products, with the prospect of their increase, brings such discouragement, unless some market can be opened beyond the present demand, it is pleasant to discover the means of relief by a diversion of labor in producing articles which we annually import to the amount of $45,238,214. The following items are taken from the imports for the average year, so called, of 1838, and exhibit a variety of products of various branches of business, in the raising and making of which the people of this country might engage with advantage. Many others, indeed, might be enumerated, by which a saving could be secured of millions of dollars in the United States. Enough, however, is here given to show where some alleviation lies. It is gratifying, also, to observe that, by the last Report of the Secretary of the Treasury, the exports from the United States, for the year ending 30th September, 1842, have exceeded our imports

nearly $5,000,000, notwithstanding the great decrease of business, and the very low price of cotton—the principal staple of foreign export. In 1839, our imports exceeded our exports by more than $41,000,000; the next year, (1840,) the exports exceeded the imports by $24,000,000; but, taking the four years (1839, 1840, 1841, 1842) together, the imports have exceeded the exports by $18,000,000, or an average of $4,500,000 a year, the whole of which excess, and much more, might be removed by supplying ourselves with the following articles:

Value of certain articles imported in 1838.

Articles.	*Amount.*	*Total.*
Silk, manufactures of	$9,454,160	
Silk, sewing	358,178	
		$9,812,338
Silk and worsted goods		1,522,272
Cotton manufactures		6,599,330
Hemp, unmanufactured	512,506	
Ticklenburgs, osnaburgs and burlaps	362,725	
Sheetings, brown and white	325,345	
Sail duck	683,070	
Manufactures not specified	47,292	
Cotton bagging	173,325	
Cordage, tarred, and cables	75,142	
Cordage, untarred, and yarn	9,917	
Twine and packthread	88,338	
		2,277,660
Iron and steel, manufactures of	3,069,507	
Iron castings, vessels and other	69,698	
Nails, spikes, burred iron, sheet, &c	801,666	
Bar iron	2,991,317	
		6,932,188
Copper, brass, tin, pewter, and lead, manufactures of		355,491
Wood, manufactures of		199,514
Leather, manufactures of		594,648
Glass ware, not specified	310,726	
Demijohns, bottles, and phials	165,047	
Window glass	55,227	
		531,000
Clothing, ready-made		225,732
Raw silk		29,938
Brushes of all kinds		27,039
Paper hangings		39,988
Indigo		363,406
Woollens, flannels, baizes, and carpetings		475,332
Wines		2,318,282
Oil, olive, linseed, hemp seed, and rape seed		286,835
Sugar		7,586,825
Cigars, snuff and other manufactured tobacco		846,937
Salt		1,028,418
Coal		308,591
Steel		487,334
Rags		465,448
Copper, in bars, &c	838,916	
Copper sheathing, &c	551,781	
		1,390,697
Wool, under 8 cents per pound	445,488	
Wool, over 8 cents per lb	87,493	
		532,971
		$45,238,214

Such being the case with us, it seems very desirable to ascertain what is the prospect of a foreign market; and this must lead us into an examination of the feasibility of shipping our products, so as to enable the agriculturist to obtain what may be deemed a reasonable compensation for his labor. This subject divides itself into two questions:

1. What markets are or may be expected to become open to our produce, or who will take our products if we will furnish them?

2. What is our prospect of success in the competition with other producers in the same market?

MARKETS AT HOME OR ABROAD.

The question how shall our surplus products be

disposed of, is one of deep interest to the people of this whole country. A HOME MARKET, it must be admitted, is the most sure and important.—Still even a revival or extension of manufactures (it may be for many years to come) probably might not create a demand equal to the loss of consumption of many articles of agricultural export, hitherto purchased from the North and West, required by the Southern States. By the census of 1840, it appears that, in 1839, there were 791,749 persons engaged in manufactures. This number, however, is small, compared with the number of those who were consumers in the South, when it was thought more profitable to buy breadstuffs than to raise them, and who are thus withdrawn from the population on whom the great agricultural districts depend for a market. The case is now changed. The low price of cotton compels the planter to raise all he can for the support of his hands. This, it is thought, will be continued, though he may hold on to cotton as the best article for export. Mississippi is a striking instance of the truth of this remark. In 1836, that State was supposed to have purchased from the Northwestern States $2,000,000 worth of produce, and is now raising wheat and corn most successfully on the uplands, especially those contiguous to Tennessee, where both flourish so well; and it is stated, on high authority, that soon there will not be needed more than $200,000 worth from out of the State. The surplus produce throughout the whole country is perhaps not so much occasioned by the suspension of the manufactures as by diversion of labor from cotton to the raising of articles of consumption rather than of exportation. Necessity, with her iron grasp, is pinching still closer and closer, and a return even to domestic and household manufactures will, it is believed, to some extent take place. Things are cheap or dear relatively. As the value of money increases, prices fall. If extravagance and idleness have spoiled many of the rising generation, then that necessity which commands will check the evil. There is, however, nothing discouraging in all this. Our country is fertile, our real wants will be abundantly supplied, while health and happiness will follow laborious occupations. Thousands driven from other countries by a sheer want of food will constantly press hither for a better home. Operations to accumulate wealth will be more rare, while moderate competency will crown its possessors with higher blessings than riches can bestow.

The present state of the world deserves consideration. It is a time of general peace between the great European Powers, and the last year's crops every where, except in France and part of Spain, have been so large that the demand for our surplus products is small. And while the home demand is so inadequate we must create a domestic market to a much greater extent, or seek a foreign one with all its fluctuations, and consent to such reduction of wages as will enable us to compete with pauper labor abroad. A reduction to meet the emergency will not fall alone on the laborer. Food constitutes his greatest expense, and this he must and will have. On the proprietor, then, the loss will be more serious and abiding.

PROSPECT OF A FOREIGN MARKET.

Let us, then, look at the prospect of finding a foreign market for our surplus. In the consideration of this subject, we may inquire what market may be found to consume our exports? It is true the present is a remarkable period. With the European world at peace, little diversion there from agriculture can be expected. The crops of England, Holland, Ireland, and most of the grain-growing countries on the continent, are large.—But such a state of things may possibly not soon again occur; either war may rage, and occasion a demand for supplies, or a practical failure of the crops may create a scarcity. If we examine this question of a foreign market somewhat more closely, we may, perhaps, discover encouragement. England cannot much longer depend on her own supply, even with good crops. The truth of this assertion may be easily shown.—Professor Johnstone, in his recent work on agricultural chemistry, thus alludes to the condition of England in this point of view:

"The superficial area of Great Britain comprises about fifty-seven millions of acres, of which thirty-four millions are in cultivation, about thirteen millions are incapable of culture, and the remaining ten millions are waste land, susceptible of improvement. The present population, therefore, is supported by the produce of thirty-four millions of acres; or every thirty-four acres raise food for about twenty people. Suppose the ten millions of acres which are susceptible of improvement to be brought into such a state of culture as to maintain an equal proportion—the most favorable supposition—they would raise food for an additional population of about six millions, or would keep Great Britain, independent of any large and constant foreign supply, till the number of inhabitants amounted to twenty-six millions. But, at the present rate of increase, this will take place in about twenty years; so that, by 1860, unless some general improvement take place in the country, the demands of the population will have completely overtaken the productive powers of the land."

How vastly different, in this respect, is our own country. We have breadstuffs already above our own consumption enough to feed many millions. And we differ also from England in this respect: that our unoccupied lands are in a much greater proportion susceptible of cultivation. When the vacant land in the United States is improved, even to the extent of the present culture, we shall be able to sustain three hundred millions of popular tion. Even the thirty-nine million acres of prairie heretofore mentioned, allowing twenty bushels of wheat to an acre, would produce seven hundred and eighty millions of bushels, which would be six and a half times more than the whole wheat crop by estimate for 1842.

Shipments of some articles to England by direct trade, even under the present British tariff, may be made with advantage. Soon, however, it is believed that exports will go through the Canadas at a still lower tariff. As this subject is one of deep interest to the United States, much attention has been devoted to it in connection with these remarks. The following table exhibits the present (Sir Robert Peel's) tariff of articles from the colonies and from the United States direct:

British Tariff.

Articles.	*Of or from British possessions.*		*Foreign produce.*	
	s. d.	et. m.	s. d.	et. m.
Bacon, per ewt	3 6 about	½ 0 per pound	14 0 about	2 0 per pound
Beef salted, not being corned beef, per ewt	2 0 about	0 4 per pound	8 0 about	½ 0 per pound
Tongues, per cwt	2 6 about	½ 0 per pound	10 0 about	2 0 per pound
Butter, per cwt	5 0 about	1 0 per pound	20 0 nearly	4 0 per pound
Cheese, per cwt	2 6 about	½ 0 per pound	10 6 little over	2 0 per pound
Eggs, per 120	0 2½ not quite	1 0 for 2 dozen	0 10 about	2¾ per dozen
Ham of all kinds, per ewt	3 6 nearly	¾ 0 per pound	14 0 about	2¾ per pound
Lard, per cwt	0 6 not	1 0 per pound	2 0 about	0 4 per pound
Pork salted, not ham, per cwt	2 0 about	0 4 per pound	14 0 about	2¾ per pound
Cranberries, per gallon			0 1 about	15 0 per bushel
Pot or Pearl ashes	Free		0 6 when for home cons'n.	
Oil seed cakes, per ton			1 0 or 22 cents.	
Linseed, per cwt			0 1 or 1¾ cents.	
Rapeseed, per cwt			0 1 or 1¾ cents.	
Beeswax, per cwt	2 0 or	44 0	1 0 or 22 cents.	
Stearin Candles			0 2½ or about 4 cents.	
Tallow, per cwt	3 2 nearly	¾ 0 per pound	0 3 or about 5½ cents.	
Castor oil	1 3	¼ 0 per pound		

Wheat, of foreign production, according to the sliding sale, reduced to federal money.

Price per bushel.	*Duty per bushel.*
Under $1 53	60 cents.
$1 53 and under $1 56	57 cents.
1 56 and under 1 65	54 cents.
1 65 and under 1 68	51 cents.
1 68 and under 1 71	48 cents.
1 71 and under 1 74	45 cents.
1 74 and under 1 77	42 cents.
1 77 and under 1 80	39 cents.
1 80 and under 1 83	36 cents.
1 83 and under 1 86	33 cents.
1 86 and under 1 89	30 cents.
1 89 and under 1 92	27 cents.
1 92 and under 1 95	24 cents.
1 95 and under 1 98	21 cents.
1 98 and under 2 07	18 cents.
2 07 and under 2 10	15 cents.
2 10 and under 2 13	12 cents.
2 13 and under 2 16	9 cents.
2 16 and under 2 19	6 cents.
2 19 and over	3 cents.

Wheat meal, and flour, for every barrel of 196 pounds, a duty equal to that on 38½ gallons of wheat.

Wheat, &c, from British possessions, &c.

Articles.	*Price per bushel.*	*Duty per bushel.*
Wheat	Under $1 51	Nearly 15 cents.
	From 1 51 to $1 54	10 cents.
	From 1 54 to 1 51	8¾ cents.
	From 1 57 to 1 59¾	5½ cents.
	From 1 59¾ and upwards	3⅔ cents.
Barley	Under 77	About 7 cents.
	87 and upwards	2 cents.
Foreign	Under 71½	About 30 cents.
	About 1 02 and upwards	About 2½ cents.
Oats	Under 65½	About 5 cents.
	63¾ and upwards	1½ cents.
Foreign	Under 5½	22 cents.
	74½ and upwards	3 cents.
Rye, peas, and beans	Under 82½	8 cents.
	88½ and upwards	1½ cents.

Wheat meal, and flour, for every barrel of 196 pounds, a duty to that on 38½ gallons of wheat.

From high authority we learn that "Canadian wheat has been subject to a duty from England, varying from 6d. per quarter up to 5s., and flour in proportion; and, although the shipper of wheat has been compelled to furnish a certificate of its colonial origin, the flour ground from American wheat has gone from Canada, as colonial, at the low rate of duty; and hence the large trade which has of late years sprung up between Canada and the Western States, with so much advantage to both, but *particularly the latter.* The colonists have been incessantly urging the demand on the mother country for free admission of their breadstuffs, but have been denied this boon on the ground that such an arrangement would enable Americans to send in their grain free *from all duty;* but they have been led to believe that, in case they impose a duty on American wheat, theirs will thus be admitted into England *duty free.* Accordingly, last session of the Canadian Parliament, a duty of 3s. sterling per imperial quarter, or 4½d. sterling per imperial bushel, was imposed by the Canadian Parliament; which act was reserved for the assent of the Imperial Government, it being understood that, unless the latter admit Canadian grain free of duty, the act will not take effect." "The Canadian millers and merchants have advocated the free admission of American products, while the agriculturists, who return a large majority of the representatives in Parliament, have protested against it."

If the new law enacted by the Canadian Government goes into operation, as is expected in July next, the following will be the duties charged on American produce landed at Liverpool in British vessels: "With regard to provisions, a duty of 3s. per cwt. has been imposed on salted meat, 8s. on butter, 5s. on cheese, and 2s. per barrel on flour, by an act of the Parliament, to take effect next July. The Provincial Parliament will, probably, impose duties on fresh meat, on cattle, and all sorts of grain. These duties, however, will be small."

According to a statement of duties payable on articles of produce of the United States into the Canadas, the following articles pay an additional duty of 5 per cent., imposed by the Provincial States, besides the duty laid by Sir Robert Peel's tariff: pot or pearl ashes, flax, hemp, hams, bacon, hay, hides, and meal. Among the articles at present admitted into the Canadas free are beef, Indian corn, grain of all kinds, flour, and pork. Lard is subject to a provincial duty of 15 per cent. ad valorem; Molasses 1d. sterling per gallon, and 4s. 6d. per cwt.; sirups 1d. sterling per gallon, and 1s. 6d. per cwt. These duties are all paid in sterling money, at the rate of 4s. 4d. the dollar, equal to 5s. 1d. Canada currency, or nearly 102 cents. The imperial duties are levied on the amount of the invoice cost in the United States, and adding thereto 10 per cent. For instance, should the amount of the invoice be £100, the duty is charged on £110. The provincial duties are charged on the amount of invoice without the additional 10 per cent. As these subjects are of much importance to those who can avail themselves of any opening for their produce into the Canadas, the provincial tariff now in force, as published by a firm in St. John's, for the information of those with whom they trade, and also a letter from William Macrae, collector at St. John's, to the collector of Burlington, Vermont, describing the change proposed in the provincial regulations, &c, are added. They may be found in the Document, (Nos. 16 and 17.)

This new channel of trade will, doubtless, make quite a diversion from the canals leading to our seaports, but from these seaports there will be better markets from the Middle and Southern States. Some judgement may be formed as to this trade from the fact that there were transported, through the Welland canal, from the United States, to Canadian ports—

Articles	In 1840.	In 1841.
Flour.....	186,864 bbls.	193,137 bbls.
Beef and pork .	14,389 bbls.	24,195 bbls.
Wheat.....	1,720,659 bus.	1,212,458 bus.
Corn	27,085 bus.	90,158 bus.

The amount of products, for the past year, exported to Canada from Cleveland, is estimated at $1,016,796.

The following are some of the articles mentioned:

Articles.	*Quantity.*	*Value.*
Wheat.....	380,684 bush.	$319,177
Flour.....	94,248 bbls.	382,729
Corn.....	59,670 bush.	19,393
Brooms.....	1,475 doz.	1,721
Beef.....	1,348 bbls.	8,667
Lard.....	178 bbls.	1,656
Pork.....	44,750 bbls.	260,049
Clover seed...	11 lbs.	132
Oats.....	2,200 bush.	500
Tallow.....	107 bbls.	1,480
Hams.....	72,106 lbs.	3,625
Staves.....	92,000	2,355
Rye	1,453 bush.	726
Cheese	23,163 lbs.	1,015
Broomcorn....	6,000 lbs.	300
Butter.....	1,595 lbs.	122

From the above it will be seen that there must be an increase in this colonial trade from year to year.

The inquiry may arise, Will England accede to the request of the Canadian Parliament, who ask that produce shipped from these provinces, having paid a certain duty, may be admitted into England without duty? From the best opinion that can be formed from our Canadian correspondence, there can be little doubt that the experiment will go into operation. The reasons which lead to this conclusion are the following: In this trade England benefits her colonies by the duty. She can thus supply her poor at home, without any further modification of her corn laws, and she can secure to her own commerce the carrying trade, and also the grinding of large quantities of wheat in Canada. These are weighty motives. She also has a desire to increase, as she may thus do, the trade with her best customer, the United States; and this will aid in the accomplishment of such a plan. It may be asked here what effect this new trade will have. To determine this point, the following statement is presented of the

price in England of some of the leading articles, to authorise the trade. The cost of shipment charges and the result will show the value of the goods at the port of the shipment from the United States. The widening of the Welland canal, which connects Lake Erie and Lake Ontario, and the late experiment of a ship channel round the rapids of the St. Lawrence, open a direct communication from Sandusky, on Lake Erie, with Liverpool: hence freights will probably be very low. It may be remarked here, in passing, that the inspection laws of the State of New-York are said to be so greatly at variance with the mode in which provisions must be packed for the English market, that, unless some alteration takes place, this circumstance will prove injurious to our trade in this respect.

The mode in which provisions should be prepared for the English market is subjoined in Document No. 18, from a description published for the benefit of those who are engaged in this business.

As shipments will also be made to other parts of Europe besides England, the freight to Liverpool or Havre, from New-York and New Orleans, or Boston, are also included in the following table:—

Price of articles in England: Lard, 38*s.* to 43*s.* per cwt.; = to $8 36 to $9 36.

Cost of shipment or freight from Cleveland to Montreal, 47½ cents per hundred.

Cost from Montreal to Liverpool, about 70 cents per hundred.

Cost to New Orleans from Cincinnati, 75 to 87 cents per barrel.

From New Orleans to New-York, 75 cents per barrel.

From Cleveland to New-York, 55 cents per hundred pounds.

From New-York to Liverpool, 33 cents per hundred pounds.

From Cleveland to Boston, 60 cents per hundred pounds.

From Boston to Liverpool, 38½ cents per hundred.

From New Orleans to Liverpool, 50 cents per hundred pounds.

It may be interesting to ascertain also the advantage of shipping a leading article on which the colonial duty is nominal, by the Erie canal and New-York, or by the Welland canal and Montreal, viz:—

Freight per 112 pounds on lard from Cleveland to Montreal	50
Montreal to Liverpool	70
Colonial duty on importation in Canada 15 per cent. ad valorem	90
Duty on this colonial produce in England	11
	$2 21
From Cleveland to New-York	55
New-York to Liverpool	33
Duty on foreign produce by Sir Robert Peel's tariff	44
Being 89 cents in favor of the New-York route	$1 32

The question may be asked, What will wheat be worth, in the Western States, to manufacture flour for the British market, if the same is admitted via. Canada at 3*s.* per quarter, equal to 44 cents per barrel? Wheat, at Lafayette, Indiana, which must be transported by canal to Lake Erie, 230 miles, is taken as an instance.

The price in England is now 27*s.*, equal to	$5 94
Cost of wheat, for a barrel 4¾ bushels, at 50 cents	$2 37
Barrel and manufacturing with offal	50
Freight to Lake Erie	62½
From Lake Erie to Montreal	85
From Montreal to Liverpool	80
Duty at Liverpool, if ground in the Canadas	44
	$5 58½
The exchange on England is worth 7 per cent., say	40
The whole surplus is allowed for contingencies and commissions	36
	76

It may not be unacceptable to the producer to learn the value of his commodity in the market of exportation.

A New Orleans price current of January 7th, 1843, quotes lard at 6¼ cents, and hams at 7 cents. The question arises, What is pork worth to the farmer on the western waters, where the shipment to New Orleans is estimated at 75 cents per barrel?

A fat hog, weighing 309 pounds, will furnish two hams weighing, together, about 42 pounds, leaving 258 pounds of pork. If this is reduced to lard by the most expeditious and profitable manner, viz: by steaming, we may expect about 60 per cent. of lard, equal to 154 80 pounds, which, at 6¼ cents, amounts to $10 67

Add 42 pounds of ham, at 7 cents	$2 94	
Deduct shrinking and curing	94	
		2 00
		12 67
Deduct keg or barrel	75	
Also freight to New Orleans	67	
Commissions and contingencies	75	
		2 17
		$10 50

This gives $3 50 per hundred for the hog as dressed.

Lard if shipped to Liverpool, will afford a greater profit, as will appear by reference to the table of cost of shipment to Liverpool from New Orleans, above given.

As such a comparison may be of use to some, a *pro forma* bill of lard or tallow shipped from New-York to Havre, covering the whole cost and charges reduced to federal money, is added, by which it will be seen that this article will bear transportation.

Sale of 100 *casks of tallow at Havre.*

Articles &c.	*Amount.*	*Total.*	*Aggregat*
	Lbs.	*Dolls. Cts.*	*Dolls. Cts.*
100 casks, weighing, gross kilog's 40,625	91,406		
Tare 4,875	10,968½		
Total kilogrammes 35,750	80,437½ at 10. 45c.		
Charges.	per lb.....	.....	8,333 87½
Insurance on $7,218 75 at 1 per cent.....	$72 18¾		
Brokerage	7 45¼		
.....	.....	$79 64	
Freight on 59,580pounds, at ½ per cent.....	447 90		
Primage, at 5 per cent.....	22 40		
.....	.....	470 30	
Share in the unloading expenses.....	.....	9 37½	
Duty on gross pounds, $91,406 93¾ for.....			
112 pounds, $761 72; 10th and stamps,.....			
$76 22; (discount 1⅓ per cent.).....	.....	827 79½	
Cartage and warehouse, receiving and delivering	.....	32 81½	
Sampling, coopering, and taring.....	.....	18 75	
Brokerage, at ¼ per cent.....	.....	21 12	
Warehouse rent, at 50 cents per cask per.....	.....		
month, and fire insurance.....	.....	17 82	
Postage and petty charges.....	.....	5 81	
Guaranty.....	.....	42 23	
			1,515 65½
			6,807 72

While England will no doubt receive most of our importations, (should the price of freight and duties permit,) as France and Spain are reported to have short crops, and consume some of our articles of export, they may afford us a fair field of operation.

SUCCESS OF COMPETITION.

Another question is also one of deep interest to us. Were England to open her ports to us, or so to modify her tariff that our surplus produce might be shipped to her ports, could we compete with other and nearer producers? The fear has been often expressed, that were the ports of England open, markets nearer the United States, on the continent, would compete with us successfully.—Such would naturally be the conclusion, (when we reflect that steamers sail in two days from Hamburg to London,) had not a very minute examination been made, by direction of high authority, into the ability of the continent, &c, to supply Great Britain with breadstuffs.

The subject of her future supply has long been one of deep interest to that country, as bearing so directly on her corn laws; and extensive investigations have been ordered, and much information obtained. Lord Palmerston, in June, 1840, addressed a number of queries to Her Majesty's consuls at St. Petersburg, Riga, Liebau, Warsaw, Odessa, Dantzic, Stockholm, Konigsburg, Stetin, Memel, Elsinore, Hamburg, Rotterdam, Antwerp, and Palermo, embracing the points connected with all the grain growing countries of Europe; and written answers were required as to the quantity of grain which should be exported if the corn trade were open at a moderate duty; the average prices; the freight, &c.—In answer to these inquiries, a minute detail of facts shows that little reliance can be placed on the continent for a supply. The soil contiguous to the seaports has already been extensively tilled, and cannot be pushed further without the aid of artificial manures, while the bad roads from the interior shut them out from a competition with us.

Thus in Russia: The corn districts are too remote from the seaports for the grain to be ready, in season, for exportation; the rapid increase of manufactures has withdrawn from tillage, &c.

In Poland there is a deficiency of manure, and scarcity of hands, and want of skill in cultivation.

From Odessa, the report is that the crops are precarious, on account of drought; tillage is defective, and improvement difficult; distances great; no roads; the rivers unnavigable; the landholders impoverished, and no improvements to be expected.

The following is the result, imbodied in a table by Mr. Curtis, who has lectured on the corn laws in England, and which is taken, in part, from Mr. Leavitt's memorial, published for the use of the Senate, by an act of July 1, 1842—a document containing much valuable information.

Answers from	*What quantity of wheat might be expected in England.*	*Average price of wheat.*	*Whether the quantity produced would be materially increased.*	*Freight per quarter.*	*Cost, per bushel on board of vessels at Liverpool.*
	Quarters.	*s. d. s. d.*	*Answers.*	*s. d. s. d.*	*Dols. cts.*
St. Petersburg	192,500	39 1 to 0 0	No	4 5 to 5 0	0 93½
Riga	.....	49 7 to 0 0	No	4 9 to 0 0	1 150
Liebau	30,000	43 7 to 0 0	No	4 6 to 5 0	1 32½
Odessa	150,000	26 6 to 0 0	No	10 0 to 0 0	1 00
Warsaw	300,000	36 0 to 0 0	To a certain extent, say	.....	1 42
Stockholm	1,000	30 0 to 35 0	Yes, if foreign capital were employed	3 6 to 4 0	0 99
Dantzic	315,000	40 0 to 0 0	No	3 6 to 4 0	1 19½
Konigsburg	65,000	40 0 to 45 0	No	4 0 to 6 0	1 30½
Stettin	250,000	40 0 to 0 0	No ?.	4 0 to 5 0	1 22
Memel	5,964	35 0 to 0 0	Might be increased one-fourth if there were a great demand	4 0 to 5 0	1 09½
Elsinore	175,000	30 0 to 36 0	Yes	3 6 to 5 0	1 02
Hamburg	538,000	35 0 to 46 0	Probably not	2 6 to 5 0	1 21½
Rotterdam	.....	55 0 to 0 0	To no great extent	2 0 to 2 6	1 57
Antwerp	.....	56 5 to 0 0	No	2 0 to 2 6	1 61½
Palermo	200,000	38 0 to 0 0	Would increase in three or four years	8 3 to 0 0	1 27
Total	2,222,464				
Gen'l average	.....	...40*s* 6*d*.....	.....	..4*s* 9¾*d*..	1 24½

It may also be gratifying to some to compare the transportation of flour, &c, from Poland (one of the greatest grain-growing districts) and the United States, to England.

From Poland to Dantzic, the grain is chiefly brought from the interior in flatboats of the rudest construction, similar to those in use on the Western waters of the United States, at an expense of 25 cents per bushel, open to the weather, &c. During the voyage the wheat sprouts, and forms a thick mat or covering for the bulk. On reaching Dantzic, the boat is broken up and sold, the wheat taken out and dried in the fields, then stored in the ware-houses at an expense of 6 cents per bushel. From Dantzic to England the freight, &c, not including the duty, is nearly 8*d*.—equal to about 15 cents per bushel; making in all about 46 cents per bushel. From Illinois to Liverpool the whole freight would be 14*s*. per quarter, or 1*s*. 9*d*.—equal to 38 cents per bushel; being about 8 cents in favor of Illinois. There are costs and charges also, in both cases, which would probably be in favor of our export.

In this connexion, it may be interesting to compare a detailed estimate of the exports of wheat from Illinois to England, both by New-Orleans and Canada.

Illinois wheat, via. New-Orleans to Liverpool.

Wheat, 4⅘ bushels, at 50 cents is	$2 37
Grinding and barreling, (with offal)	50
Freight to New-Orleans	62
Freight to Liverpool	66
	4 15

which is a little less than 90 cents. Charges would be alike in both cases.

View the matter in another point of light. Suppose we carry our grain or flour through Canada, and pay, after the 5th July, 3*s* on an imperial quarter, viz: 8 bushels, which is about 8½ cents per bushel: Foreign wheat would have to pay, at the present sliding rule, about 60 *cents* per bushel. Could they compete with us?

We therefore could succeed with the greatest competitor; but that competitor cannot supply 1½ million of bushels, less than the surplus of some of the smaller States of this Union produce; and, indeed, all Europe could not supply England with more than 18,000,000 bushels, under the most favorable circumstances—about three-fourths as much as the State of Ohio now furnishes.

It may be remarked, too, that the crops on the continent are far more precarious than those of the United States; and hence the continental Governments find it necessary, and are careful to reserve large granaries, to guard against such a misfortune as a failure of the usual harvest. Exportation thence is also forbidden in certain cases, but in the United States no such prohibition exists.

While, therefore, we may look with confidence to advantages in our favor in the British market, we must remember that we have to compete against almost unpaid labor, and cannot expect a great profit on our culture unless the very cheapest mode of production is studied. Labor (as we have before remarked) must doubtless fall very considerably in agricultural districts, or else farmers and planters cannot hire.

That such is the case appears from the fact, that already it has been announced in the papers of the day that a reduction is contemplated in Maryland and elsewhere. Nor is this fall of the price of labor to be much regretted, if the wants

of the increasing population can be as well supplied by the present low wages as those of former years by the wages then obtained. Food has usually constituted the great expense of the poor. The reduction of an inflated currency must of necessity be attended with the corresponding reduction in the price of labor and the value of property. The change is evidently better for the people in the end; and though the transition from the fancied prosperous days of speculation caused by a spurious currency may deeply affect those who are indebted, a regular healthy trade, formed upon a currency based upon specie, will certainly be most desirable, and to none more so than to the yeomanry of our country, who toil in great honesty and industry to sustain society, and depend on sage Legislatures to make wise and safe laws to protect their hard-earned gains.

PROBABLE MODIFICATION OF THE CORN LAWS.

A further inquiry is here suggested. The supposition has been made above that England will materially change or even repeal her corn laws. This question has been examined, and the result is, that there is much to fortify the conjecture that such must eventually be the result. Her population is increasing. The uncultivated lands are continually becoming less in proportion. What is tilled is much of it carried to the highest point of cultivation. If she would avail herself of her advantages of extent of territory, and new acquisitions as a mart of her exported manufactures, she cannot spare many from that branch of industry to agriculture. The sufferings of the poor and the burden of her poor laws are very great. A steady advance has been made for some years towards this result. The Manchester Chamber of Commerce, comprising the most eminent merchants and manufacturers, after a debate of ten hours at two sittings, have declared, by a vote of six to one, that *unless the corn laws are immediately abolished*, the destruction of their manufactures is inevitable. The information the people have received of our vast surplus product has urged them forward, as they see thus the means of supply within reach. It has been ascertained by an eminent English baker, that the American flour, either in biscuit or bread, will absorb from one-thirteenth to one-seventh more of its weight in water than any other flour. It is also stated, that 14 lbs. American flour will make 21½ lbs. of bread, while the best kind of English flour will produce but 18½ lbs. About one crop in seven, in England, (some say a less number,) is a failure. The London Mark Lane Express estimates the total averange product of the United Kingdom at 320,000,000 bushels, and that the crop of 1841 fell short at least 86,000,000 bushels. Every diminution of any considerable amount must be supplied from abroad. The present sliding scale of duties prevents the American importer from availing himself as much as he would do, of his information and sending out cargoes, even when the price is such as to render it profitable; for before his ship reaches the port, the duty may rise so high as to make it a dead loss. In 1841, when the imports of wheat into England were 21,604,840 bushels, the whole amount from the United States was, 2,528,600 bushels; in 1840, when the whole import of wheat was 18,502,120 bushels, the United States sent out 6,831,000 bushels. The yearly consumption of all kinds of grain in Great Britain is estimated at 52,000,000 quarters, or 16,000,000 bushels, of which wheat is about 104,000,000 bushels. This probably would be much increased, were bread to be brought down to a lower price. The quantity of wheat imported into Great Britain from Ireland, in 1832, was 552,720 quarters; in 1839, but 90,600 quarters; and, owing to the temperance reformation, by which the consumption of food will be increased, this will probably be still more lessened.

From the English Farmers' Journal, which we quote here in substance, it appears that, on the day fixed for the payment of reduced duties on salted provisions, public sales were announced to take place on the following day; which sales comprised 1,512 barrels of American beef, 2,199 barrels of American pork, 321 barrels of American hams, 691 barrels of Canadian pork, and 35 barrels Canadian beef. There was a numerous attendance of town and country dealers, also gentlemen from Ireland, to watch the progress of a trade threatening to interfere with their trade so long exclusively enjoyed. The United States meat was imported months before, and cured before it was known that there would be a change in duties, and therefore not so well suited to the taste of consumers as it may hereafter be. The meat was well fed, but fatter than the usual Irish. The beef was not so well fed. The hams sold at 30s. 6d. to 31 per cent., duty paid, equal to about 6 cents per pound; prime beef sold at 38s. to 39s. per barrel, duty paid—about 4½ cents per pound; pork went at from 41s. to 46s. per barrel, duty paid—equal to 7½ cents per pound; the Canadian pork realized 43s. to 46s. per barrel, duty paid, &c. From the most recent account, it would appear that American provisions are in some demand; and if our countrymen will adopt the English methods of curing and packing, so as to suit the taste of the foreign purchaser of their articles of export, there seems little reason to doubt that a considerable trade might be carried on. Much complaint is made of the mode of preparation, and hence attention to this is the more necessary to compete with the Irish producers.—The quantity of our flour exports, it is said, depends greatly on the price in the home market. Thus it is said that in 1834, a year of abundance in England, when the price of flour was $5 45, there were exported 835,352 barrels, nearly as much as in 1839, in which there was a short crop in England; and when flour was $7 56 in our market, when the export amounted to 1,897,501 barrels of flour, at $5 37. On examination, also, it appears that for twelve years, from 1829 to 1840, more than one-half the whole imports paid an average duty of about six cents per bushel. Taking twelve years together, from 1828 to 1839, it appears that Great Britain has raised sufficient for her own supply only four years out of twelve; in two out of three she has found it necessary to import, varying from 2½ to 20 per cent. of her whole consumption. A considerable portion of land better fitted for grazing has been forced into cultivation for wheat by the high prices it has commanded there.

The following table, taken from a list of prices in the Farmers' Magazine, gives the highest and lowest prices per quarter of wheat; also, the months of each, with the average of each year from 1834 to 1840.

	1834.	1835.	1836.	1837.	1838.	1839.	1840.
	January.	August.	December.	January.	December.	February.	September.
Highest..........	49s. 10d., or about $1 37 per bushel.	42s. 10d., or $1 39½ per bushel.	60s. 3d., or $1 65½ per bushel.	60s., or $1 65 per bushel.	72s. 5d., or $1 99 per bushel.	79s. 8d., or $2 19 per bushel.	72s. 3d., or $1 99¾ per bushel.
	November.	December.	January.	December.	January.	November.	December.
Lowest..........	41s. 8d., or about $1 15 per bushel.	36s. 8d., or $1 01 per bushel.	36s. 5d., or $1 per bushel.	52s. 6d., or $1 44 per bushel.	52s. 10., or $1 45 per bushel.	66s. 11d., or $1 84 per bushel	66s. 3d., or $1 83 per bushel.
Average..........	45s. 3d, or $1 26½ per bushel.	38s. 11d., or, $1 20 per bushel.	48s. 4d., or $1 32½ per bushel.	56s. 3d., or $1 54¼ per bushel.	62s. 7d., or $1 72 per bushel.	73s. 3d., or $2 01 per bushel.	69s. 3d., or $1 91 per bushel.

Thus it appears, that out of the whole seven, the highest price was in a winter month, except two years, when it was in August and September; also, that the lowest price, for five years, was in a winter month—in the other two years in the month immediately preceding a winter one. It also appears that the average has been almost constantly rising, except for the year 1840. The price of flour, it is said from Dantzic, delivered at London, could not be less than $7 per barrel, without duty. Such are the facts with respect to England, and her dependence on other countries for her breadstuffs.

The case is similar in France. When the crop, which at an ordinary rate will just about supply her population, fails, great distress ensues, and of necessity they must look abroad for a supply.

Since, then, we must either have a home or a foreign market for our surplus, we are driven to the necessity of so far upholding our own manufactures, and creating a greatly increased consumption, or we must seek to extend our foreign market. The discriminating duties, imposed by Great Britain in favor of the intercolonial trade in her own vessels, will continue to operate against the best competitors in foreign markets with our agricultural products, till the United States herself makes a new conventional arrangement based on terms of fuller reciprocity. In the mean time, however, it is a matter of no small gratification that an outlet can be had through the British American provinces for several articles. Indeed, so strong is the desire manifested by the commissioners in the mother country, that the laws are construed in the most liberal manner. Thus, while the south has long enjoyed the privilege of sending out her principal staple duty free, in consequence of the desire of the British manufacturers to obtain it, so now it seems probable that the other agriculturists of our country in the north and west, may be enabled to forward their wheat and other produce through the colonies at a comparatively low rate of duty.

From many countries we are nationally excluded by prohibitory duties. Spain, for instance, levies $10 on a barrel of flour in Cuba. From Malaga, where our imports exceed our exports seven times, we are almost shut out. The list might be extended, but it is unnecessary. Could more reciprocal duties be established, a new and lasting impulse would be given to the agricultural industry of the United States. The advocates of home industry and free trade unite in the propriety of fair reciprocal arrangements, if conventional treaties are formed. Many, with long delayed hopes, are almost ready to despair; some fear an abandoment of present encouragement as incidentally given to home industry by the revenue system. While aiming to avoid the discussion of any political topics, or the protective tariff, yet it seems not entirely proper to withhold any consoling remark which saves the downcast agriculturist from absolute despondency. Reason and philosopy may enable him to endure the present, if sure no worse is to be dreaded.

The following cheering voice is heard from the south side of the Potomac. After expressing a preference for free trade, if it were practicable, it is said; "But we shall regard it as the hight of folly to throw open our ports without restriction to

other nations, so long as theirs are shut in our faces, and they continue to act upon a wholly opposite policy. The practical statesman, under such circumstances, must lay his abstract philosophy on the shelf, and work out his problems upon the actual theatre of human affairs. To buy in the cheapest market is a very plausible doctrine, but to him who is forced to sell in the cheapest market in order to reach it, the delusion is at once manifest. The great problem is, what constitutes, under all circumstances of selling as well as buying, in time to come as well as in time present, the most advantageous market to the consumer."

The halcyon days of free trade, predicted by some, ought not to change efforts made with reference to the commercial policy of the world. Some new difficulties must be met, and some changes made, to accommodate ourselves to existing circumstances. The reduction of the currency and the scarcity of money will, of necessity, reduce wages. Self-denial will take the place of self-gratification, and all possible economy will be studied. Proprietors of land and other productive property will rent on shares in preference to hiring for cash. All possible diversions of labor, too, will be made from pursuits which will produce a surplus which cannot find a market; and, whatever may be the abstract theories of burdens on the producer or the consumer, or what degree of protsection amounts to prohibition, we may expect, ere long an improved domestic market. A demand abroad of a few hundred thousand bushels of breadstuffs is heralded as a happy event, but what comparison, after all, will it bear to the million of consumers created by the diversion of labor from present agricultural pursuits, or manufacturing those articles which are more to us than the produce of foreign labor. Let us listen to the wisdom of those whose opinions are recorded for our encouragement—more especially since such opinions come from individuals who do not sanction protection, except such as incidentally arises from the raising of a revenue:—

"To be independent for the comforts of life, we must fabricate them ourselves. We must now place the manufacturer by the side of the agriculturist. The grand inquiry now is, shall we make our own comforts, or go without them at the will of a foreign nation? He, therefore, who is now against domestic manufacture must be for reducing us either to dependence on that foreign nation, or to be clothed in skins and to live like wild beasts in dens and caverns. I am not one of those; experience has taught me that manufacturers are now as necessary to our independence as to our comfort."—*Letter of T. Jefferson to Benjamin Austin, January,* 1826.

"When our manufactures are grown to a certain perfection, as they soon will be, under the fostering care of government, the farmer will find a ready market for his surplus produce, and, what is of equal consequence, a certain and cheap supply of all he wants; his prosperity will diffuse itself to every class of the community."—*Speech of Hon. John C. Calhoun on the tariff.*

"I ask, what is the real situation of the agriculturist? Where has the American farmer a market for his surplus produce? Except for cotton, he has neither a foreign nor a home market. Does not this clearly prove, when there is no market at home or abroad, that there is too much labor employed in agriculture? Common sense at once points out the remedy. Take from agrieulture 600,000 men, women and children, and you will at once give a market for more breadstuffs than all Europe now furnishes. In short we have been too long subject to the policy of British merchants. It is time we should become a little more *Americanized*, and, instead of feeding the paupers and laborers of England, feed our own; or else, in a short time, by continuing our present policy, we shall all be rendered paupers ourselves."—*A. Jackson to Dr. Coleman, April* 26, 1834.

The present, too, seems to be the proper time for us to give to this question of the disposal of our immense surplus a thorough, calm and deliberate investigation. On the decision of it the prosperity of this great country depends. It has been well said that, "to encourage the progress of agricultural improvement is the only road to national wealth." Our object should not be so much to stimulate to larger production, as to open the ways and means by which the husbandman shall have a market, and shall know how his labor and skill may be most available. For this purpose, he needs a yearly and more full survey of the crops, the markets and prices, than he can now have. Thousands and millions of dollars are lost to our country by the misemployment of productive industry, from the mere want of information; and, strange as it may appear, our own country, extensive as it is, and devoted as are its population to Agriculture, is almost the only one among civilized nations where but little has been done by the National Legislature for this great object. England, and France, and Germany, and Russia watch with deep interest, in their national capacities, over their agricultural prosperity. The farmers ahd planters are beginning to feel the importance of more regard to their interests, especially in the way of furnishing them with the means of knowledge. The return of the census every ten years is not itself sufficient. It may prove a starting point for each period, and one at which corrections may be made; but, from year to year, there should be imbodied the best results of investigation, carefully and thoroughly conducted. Something has, indeed, been thus attempted, in these agricultural statistics, subjoined to the Report of the Commissioner of Patents, and many of our hard working husbandmen have expressed their sense of the benefit thus derived, and their joy at even this care of their interests by the National Government; but this is not enough, or as much as ought to be done. In the language of one of our best agricultural journals, conducted by one who himself has held a seat in the halls of our National Legislature, and who, therefore, knows well what comparative neglect this subject has received:

"We want a system of national legislation for this purpose that shall be effectual to collect, periodically, in every State of our Union, and concentrate to one point, at the seat of the National Government, precise, accurate, authentic and official statistical information upon all the annual results of the husbandman's industry—showing to every body, at all times, as near as

human watchfulness can, upon a scale so extended, all the elements of both the demand and the supply of every article of produce that enters into our markets. With information of this description, published and disseminated through the land by Congress, with only half the profusion that partisan documents are spread by each and every party, an entire revolution in the condition and productiveness of the husbandman's labor would be effected. There would be system, certainty and confidence pervading the outlays and the income of the husbandman."

If the length of the review of the crops and accompanying remarks, combined with the various subjects found in the Documents seem at first view to be unnecessary, it is believed that the feelings of the whole agricultural community will fully justify the diffusion of a document embracing so much varied information connected with the welfare of our common country.

ACCOMPANYING DOCUMENTS.

No. 1.

Letter from Hon. John Taliaferro, of Virginia.

WASHINGTON, January 16, 1843.

DEAR SIR: I have received the letter which you did me the honor to address to me under date of the 12th instant, and I seize a moment in the hurry of other concerns to reply to it.

1st. You inquire what my experience has been in a species of wheat said to have come to us from the Mediterranean, and known by that name.

2d. What has been the result of the trials of others, in the cultivation of this wheat, within my observation.

3d. Whether this wheat resists, effectually, the ravages of the Hessian fly.

4th. What, in my opinion, are the properties of this wheat which enable it to resist, without the least injury, the ravages of an insect so ruinous to every other species of wheat.

I shall answer in the above order of the questions; but, before I do so, I will give you the result of my experience and observation as to the periods of the year in which the Hessian fly commits its ravages on wheat, and what the particular injury is at such period. The first attack of the fly is very soon after the wheat germinates, and the maggot will then be found attached to the tender sprout, immediately at or very near the point of vegetation. Hence the *radical* destruction by the fly, in the fall season, not only to large regions of a field, but not unfrequently of entire fields. This is called the fall attack of the fly; and to avoid which, farmers have been driven, by this insignificant insect, to sow wheat at a period of the fall too late to furnish reasonable expectations of a good crop, one year in ten; from the 15th of August to the 15th September is the proper season to sow wheat. The next attack of the fly on wheat commences in the spring, as soon as the weather is sufficiently warm to hatch the egg, and with us in Virginia that occurs about the middle of April, from which time till the middle of May (up to which period the ground joint of wheat, on which the maggot subsists as soon as it is hatched, remains tender and full of juice) the spring injury is done.

In reply to your first inquiry, I answer that I obtained from my friend, the Hon. Arnold Naudain, of Delaware, a specimen of the wheat, now known as the Mediterranean wheat. I have raised five crops of it, without the least injury from the fly, and none material from rust; and such has been the invariable result of many trials of this wheat, by individuals to whom I have disposed of it for seed, during the three years past.

The reason why this wheat escapes injury from the fall attack of the fly is, that it *certainly* is so constituted as to possess, and to be sustained by, a more vigorous root than any other known wheat is; so that while the fly in the fall destroys all other wheat known to us, *root and branch*, thus denuding fields more or less, according to season and other circumstances, not a root of this wheat is destroyed, owing, no doubt, to its energy.

The reason why this wheat escapes the spring attack of the fly is to be found in the same property—its energy of root—owing to which, or some other unknown cause, its growth in the spring is more rapid and vigorous than any other winter wheat; so that, by the middle of April, it attains a hard, and sapless *ground joint* impenetrable by the then young maggot, which produces the fly, and, if penetrated, furnishing no pabulum, (that is, sap,) hence the maggots, no matter how many, perish, without doing the least injury to the wheat.

The reason why this wheat is less liable to rust than other winter wheat is, that it matures from eight to ten days earlier. I have never, till last fall, sowed this wheat earlier than the 15th of September. On the 4th of last September I sowed five rows in drill, and at the same time I sowed in juxtaposition a drill of beautiful and popular white wheat. When I left home, in November, the drill of white wheat was nearly destroyed, *root and branch*, while the Mediterranean wheat was entirely free from injury.

And as I know, for the reasons stated above, that it is to sustain no injury in the spring, I look to this wheat to restore to us our true seed time, and thus to exempt the wheat crop from all maladies necessarily incident to any crop sowed or planted out of season.

I have the honor to be, very respectfully, yours,

JOHN TALIAFERRO.

H. L. ELLSWOTH, Esq.

No. 2.

WILMINGTON, *December* 19, 1842.

DEAR SIR: Your favor of the 6th instant was duly received. I am sorry I cannot give you more definite and satisfactory information in regard to our experiments; but such as I have is at your service. The fact is, that our corn was fully ripe before the least preparation had been made toward manufacturing it; and after this the delays and breakages incident to new machinery so hindered our progress that a considerable part of our crop was killed by the frost before it could be ground. Yet the greater part of the crystallized sugar, which I procured the present season, was made from this frost-killed corn. The product was undoubtedly injured, but not to the extent that might have been expected. This fact is important, as it shows the superiority of corn over cane; the latter is totally ruined by frost. The reason of

this difference is, that corn becomes more fully matured, and it is at the same time a much more hardy plant.

For evaporation, the present season, I had two copper kettles, about two feet deep, capable of holding from 50 to 60 gallons. A charge in these kettles could not possibly be finished in less than ten or twelve hours. This long-continued application of heat caused the sirup to become very dark, and deprived it entirely of the power of crystallization. Seeing this result, I procured a tin vessel (copper would have been better) about two feet long, eighteen inches wide, and six inches deep. In this, evaporation could be completed in about two hours; the sirup was light colored, like honey, and crystallized very well, though not so quickly as would be desirable.—This sirup (although so much finer in appearance, compared with that procured by the first press) is not so agreeable to the taste; it retains, to a considerable degree, the peculiar flavor of corn-stalk.

After crystallization, this taste is entirely confined to the molasses, the sugar not retaining it in any sensible degree. It appears, from my experiments, that this peculiar taste is owing to a certain substance, which may be either driven off or decomposed by the application of heat, if continued for a sufficient length of time; therefore, after the sugar is separated from the molasses, the latter should be boiled (with the addition of water, if necessary) until the corn taste is entirely removed. The shorter the time which is allowed to elapse, from crushing the stalks to finishing the evaporation, the greater will be the proportion of sugar in the sirup, and vice versa.

Professor Mapes's directions on the subject are excellent, and, if adhered to, will ensure good results. I do not think that any manufacture ever promised better in the early stages of its introduction than this has done.

We have every reason for confidence and perseverance, and none at all for despondency; time only is necessary to perfect the details, and settle the business upon a firm foundation.

A revolution in trade will then ensue, vastly important in its effects.

Hoping that we may see all this in own time, I remain yours, respectfully,

WILLIAM WEBB.

H. L. Ellsworth, Esq.,
Washington, D. C.

No. 3.

Remarks on the Manufacture of Maize Sugar, by William Webb, of Wilmington, Delaware.

The most profitable application of labor is a desideratum too freequently overlooked or disregarded by those who attempt the introduction of new manufactures into a country. All calculations of advantage which is to result from the production of any article must be made with due regard to this point, or practice will prove them to be erroneous.

Fully impressed with this truth, the most rigid examination is invited into every thing now offered; so that, as far as possible, we may arrive at a correct decision respecting the real value of the proposed manufacture. In common with many others, I have felt considerable interest in the plan for extending the cultivation of sugar in temperate climates, and have made many experiments, first upon the beet, and recently upon maize or Indian corn, in the hope of discovering some mode by which the desired end might be attained.

The results from the latter plant have been extremely encouraging. The manufacture of sugar from it, compared with that from the beet, offers many advantages. It is more simple, and less liable to failure. The machinery is less expensive, and the amount of fuel required is less by one-half. The quantity of sugar produced on a given space of ground is greater, besides being of better quality. An examination into the nature and productive powers of these two plants will show that no other results could have been reasonably expected. It is a well-established fact, that every variety of production found in plants is derived from the sap. It is also ascertained that the principal substance found in the sap or juice of many vegetables is sugar. Therefore, the amount of saccharine matter produced by any plant of this description may be estimated from an analysis of the fruit, seed, &c, of such plant, when ripe. The grain yielded by corn, and the seed from beet, in the second summer of its growth, are nothing more than this sap or juice elaborated by the process of vegetation, and presented to our view in another form.

Now, as it is contrary to the economy of nature to suppose that there should be any loss of nutritive matter in this change of sap into seed or grain, does it not follow that there must be the same difference in the quantity of sugar produced by the two plants as there is between the nutritive properties of beet seed and corn?

The juice of maize contains sugar, acid, and a gummy mucilaginous matter, which forms the scum. From the experiments of Gay Lussac, Thenard, Kirchoff, and others, [it is proved] that starch, sugar, and gum, are extremely similar in composition, and may be as readily converted into each other, by chemical processes, as they are by the operation of nature. For example: starch boiled in diluted sulphuric acid for thirty-six hours, is converted into sugar of greater weight than the starch made use of.

This result goes to show that every pound of starch found in the seed of a plant has required for its production at least one pound of sugar, in the form of sap. If it be objected that this deduction is too theoretical to be admitted, it may be answered that experiment, so far as it has gone, has fully attested its correctness.

The raw juice of maize, when cultivated for sugar, marks 10° on the saccharometer; while the average of cane juice (as I am informed) is not higher than 8°, and beet juice not over 3°.

From 9¾ quarts (dry measure) of the former, I have obtained 4 pounds 6 ounces of sirup, concentrated to the point suitable for crystallization. The proportion of crystallizable sugar appears to be larger than is obtained from cane juice in Louisiana. This is accounted for by the fact, that our climate ripens corn perfectly, while it but rarely, if ever happens, that cane is fully matured. In some cases the sirup has crystallized so completely, that less than one-sixth part of

molasses remained. This, however, only happened after it had stood from one to two months. There is reason to believe, that if the plant were fully ripe, and the process of manufacture perfectly performed, the sirup might be entirely crystallized without forming any molasses.

This perfection in the manufacture cannot, however, be attained with the ordinary apparatus. Without any other means for pressing out the juice than a small hand-mill, it is impossible to say how great a quantity of sugar may be produced on an acre.

The experiments have ceen directed more to ascertain the saccharine quality of cornstalk than the amount a given quantity of ground will produce; but the calculations made from trials on a small scale leave no room to doubt that the quantity of sugar will be from 800 to 1,000 pounds. This amount will not appear unreasonable, when it is considered that the juice of corn is as rich as that of cane, and the weight of green produce at least equal.

Mr. Ellsworth, in one of his publications states, as the result of actual weighing and measuring, that corn, sown broadcast, yielded five pounds of green stalks per square foot; this is at the rate of 108½ tons to the acre.

My attention was first directed to maize as a material for sugar by observing that, in some stalks, the juice was extremely sweet, while in others it was weak and watery. On examination, it appeared that the latter had borne large and perfect ears and grain, while, on the former, these were either small in size or entirely wanting. The natural conclusion from this observation was, that if the ears were taken off in their embryo state, the whole quantity of saccharine matter produced by the process of vegetation would be preserved in the stalk, from which it might be extracted when the plant was matured. But the idea occurred too late in the season to test it by experiment. A few stalks, however, were found which, from some cause, had borne no grain; these were bruised with a mallet, and the juice extracted by a lever press. Some lime was then added, and the dessication, evaporation, &c, beban and finished in a single vessel. By these simple means, sugar of fair quality was produced, which was sent to the horticultural exhibition of our society in 1840.

I have since been informed, through Mr. Ellsworth, that M. Pallas, of France, had discovered, in 1839, that the saccharine properties of maize were increased by merely taking off the ear in its embryo state. An experiment, however, which I instituted, to determine the value of this plan, resulted in disappointment; the quantity of sugar produced was not large enough to render it an object. The reasons of this failure will be sufficiently obvious on stating the circumstances. It was found that taking the ear off a large stalk, such as is produced by the common mode of cultivation, inflicted a considerable wound upon the plant, which injured its health, and, of course, lessened its productive power. It was also found that the natural disposition to form grain was so strong, that several successive ears were thrown out, by which labor was increased, and the injuries of the plant multiplied. Lastly, it appeared that the juice yielded from those plants contained a considerable portion of foreign substance not favorable to the object in view. Yet, under all these disadvantages, from one hundred to two hundred pounds of sugar per acre may be obtained.

The manifest objections detailed above suggested another mode of cultivation, to be employed in combination with the one first proposed; it consists simply in raising a greater number of plants on the same space of ground. By this plan, all the unfavorable results above mentioned were obviated, a much larger quantity of sugar was produced, and of better quality. The juice produced by this mode of cultivation is remarkably pure and agreeable to the taste. Samples of the sugar yielded by it are now in the Patent Office, with a small hand-mill by which the stalks were crushed. Some of the same kind was exhibited to our agricultural society in October, 1841, accompanied with an answer to an invitation from its president, Dr. J. W. Thompson, to explain the mode of culture and process of manufacturing the sugar. The molasses, after standing, as before mentioned, from one to two months, became filled with small crystals, which, on being drained, exhibited a peculiar kind of sugar; the grain is small, and somewhat inferior in appearance, but still is as sweet and agreeable to the taste as can be desired. A small sample of this sugar I have brought for your inspection. This product, from what was thought to be molasses, is a new and unexpected discovery, and discloses an important fact in the investigation of this subject. It shows the superior degree of perfection attained by the corn plant, compared with the cane, in any part of the Union. It is generally understood that the latter cannot be fully matured in any except a tropical climate, and the proportion of molasses obtained from any plant is greater or less according to the immaturity or perfection of its growth. The sweetness of the cornstalk is a matter of universal observation. Our forefathers, in the revolutionary struggle, resorted to it as a means to furnish a substitute for West India sugar. They expressed the juice, and exerted their ingenuity in efforts to bring it to a crystallized state, but we have no account of any successful operation of the kind. In fact, the bitter and nauseous properties contained in the joints of large stalks render the whole amount of juice from them fit only to produce an inferior kind of molasses. I found, on experiment, that, by cutting out the joints, and crushing the remaining part of the stalk, sugar might be made, but still of an inferior quality. The molasses, of which there was a large proportion, was bitter and disagreeable.

From one to two feet of the lower part of these stalks was full of juice; but the balance, as it approached the top, became dryer, and afforded but little. From the foregoing experiments we see that, in order to obtain the purest juice, and in the greatest quantity, we must adopt a mode of cultivation which will prevent the large and luxuriant growth of the stalk.

As we are upon the threshold of this inquiry, many other improvements may be expected in the mode of operation; for example, it may be that cutting off the tassel as soon as it appears on the plant, will prevent the formation of grain, and prove a preferable means for effecting that object.

On the whole, there appears ample encouragement for perseverance. Every step in the investigation has increased the probabilities of success; no evidence having been discovered why it should not succeed as well, if not better, on a large scale, than it has done on a small one.

1. In the first place, it has been satisfactorily proved, that sugar of an excellent quality, suitable for common use without refining, may be made from the stalks of maize.

2. That the juice of this plant, when cultivated in a certain manner, contains saccharine matter remarkably free from foreign substances.

3. The quantity of this juice (even supposing we had no other evidence about it) is sufficiently demonstrated by the great amount of nutritive grain which it produces in the natural course of vegetation. It is needless to expatiate on the vast advantages which would result from the introduction of this manufacture into our country.

Grain is produced in the West in such overflowing abundance that the markets become glutted, and inducements are offered to employ the surplus produce in distillation. This business is now becoming disreputable. The happy conviction is spreading rapidly, that the use of alcohol, as a beverage, instead of conducing to health and strength, is the surest means of destroying both. Some other production, therefore, will be required, in which the powers of our soil may be profitably employed. This, it is hoped, will be found in the business now proposed. Instead of distilleries, converting food into poison, we may have sugar-houses, manufacturing at our doors an article in universal demand, not merely useful, but necessary, furnishing as it does one of the most simple, natural, and nutritious varieties of human sustenance found in the whole range of vegetable production.

It is said that the general use of sugar in Europe has had the effect to extinguish the scurvy and many other diseases formerly epidemical. It may be doubted whether a tropical country can ever furnish a great amount of exports, except through the means of compulsory labor. It appears, then, highly probable, that if the inhabitants of temperate countries wish to continue the use of sugar, they must find some means to produce it themselves. The beet appears to succeed well in Europe, and the manufacture from it is extending rapidly; but there is no hazard in making the assertion that Indian corn is far better adapted to our purpose. The following mode of cultivating the plant, and making the sugar, is the best that can now be offered. The kind of soil best adapted to corn is so well understood, that no directions on this point are necessary, except that it should be rich—the richer the better; if not naturally fertile, manure must be applied, either ploughed in or spread upon the surface, or used both ways, according to the ability of the owner. Nothing can form a better preparation for the crop than a clover sod well turned under and harrowed fine immediately before planting.

Select for seed the largest and best ears of any variety of corn not disposed to throw up suckers or spread out in branches; that kind most productive in the neighborhood will be generally the one best adapted to the purpose. The planting should be done with a drilling machine. One man, with a pair of horses and an instrument of this kind, will plant and cover, in the most perfect manner, from ten to twelve acres in a day. The rows (if practicable, let them run north and south) two and a half feet apart, and the seed dropped sufficiently thick in the row to ensure a plant every two or three inches. A large harrow, made with teeth arranged so as not to injure the corn, may be used to advantage soon after it is up. The after culture is performed with a cultivator, and here will be perceived one of the great advantages of drilling: the plants all growing in lines, perfectly regular and straight with each other, the horse-hoe stirs the earth and cuts up the weeds close by every one, so that no hand-hoeing will be required in any part of the cultivation. "It is part of the system of cane planting in Louisiana, to raise as full a stand of cane upon the ground as possible, experience having proved that the most sugar is obtained from the land in this way." As far as my experience has gone, the same thing is true of corn. This point must therefore be attended to, and the deficiencies, if any occur, made up by timely replanting.

The next operation is taking off the ears.—Many stalks will not produce any; but, whenever they appear, they must be removed. It is not best to undertake this work too early, as, when the ears first appear, they are tender, and cannot be taken off without breaking, which increases the trouble. Any time before the formation of grain upon them will be soon enough.

Nothing further is necessary to be done until the crop is ready to cut for grinding. In our latitude, the cutting may commence with the earlier varieties about the middle of August. The later kinds will be ripe in September, and continue in season until cut off by the frost. The stalks should be topped and bladed while standing in the field. They are then cut, tied in bundles, and taken to the mill. The top and blades, when properly cured, make an excellent fodder, rather better, it is believed, than any hitherto used; and the residuum, after passing the rollers, may easily be dried and used in the same way—another advantage over the cane, which, after the juice is expressed, is usually burned.

The mills should be made on the same general principle employed in constructing those intended for grinding cane. An important difference, however, will be found both in the original cost and in the expense of working them. Judging from the comparative hardness of the cane and cornstalk, it is believed that one-fourth part of the strength necessary in the construction of a cane-mill will be amply sufficient for corn, and less than one-fourth part of the power will move it with the same velocity. It may be made with three upright wooden rollers, from twenty to forty inches in length, turned so as to run true, and fitted into a strong framework, consisting of two horizontal pieces, sustained by uprights. These pieces are mortised, to admit wedges on each side the pivots of the two outside rollers, by which their distances from the middle one may be regulated. The power is applied to the middle roller, and the others are moved from it by means of cogs. In grinding, the stalks pass through on the right side of the middle cylinder, and come

in contact with a piece of framework called the dumb returner, which directs them backwards, so that they pass through the rollers again, on the opposite side of the middle one. (See plate.) The modern improved machine is made entirely of iron, three horizontal rollers, arranged in a triangular form, one above and two below; the cane or stalk passes directly through, receiving two pressures before it escapes. (See plate.) The lower cylinders are contained in a small cistern which receives the juice. The latter machine is the most complete; the former the least expensive. These mills may be moved by cattle; but, for large operations, steam or water power is preferable. When the vertical cylinders are turned by cattle, the axis of the middle one has long levers fixed across it, extending from ten to fifteen feet from the centre. To render the arms firm, the axis of this roller is carried up to a considerable hight; and oblique braces of wood, by which the oxen or horses draw, are extended from the top of the vertical axis to the extremities of each of the arms. When horizontal cylinders are propelled by animal power, the upper roller is turned by the cogs at one end, which are caught by cogs on a vertical shaft. It is said that, in the West Indies, the purest cane juice will ferment in twenty minutes after it enters the receiver. Corn juice has been kept for one hour before boiling, without any apparent injury resulting; but so much delay is not desirable, as it may be attended with bad effects.

The process which has been employed in the manufacture of maize sugar is as follows: The juice, after coming from the mill, stood for a short time, to deposite some of its coarser impurities. It was then poured off, and passed through a flannel strainer, in order to get rid of such matters as could be separated in this way. Lime water, called milk of lime, was then added, in the proportion of one or two table spoons full to the gallon. It is said by sugar manufacturers that knowledge on this point can only be acquired by experience; but I have never failed in making sugar from employing too much or too little of the lime. A certain portion of this substance, however, is undoubtedly necessary, and more or less than this will be injurious; but no precise directions can be given about it. The juice was then placed over the fire, and brought nearly to the boiling point, when it was carefully skimmed—taking care to complete this operation before ebullition commenced. It was then boiled down rapidly, removing the scum as it rose. The juice was examined, from time to time; and if there was any appearance of feculent particles, which would not rise to the surface, it was again passed through a flannel strainer. In judgeing when the sirup is sufficiently boiled, a portion was taken between the thumb and finger; and if, when moderately cool, a thread half an inch long could be drawn, it was considered to be done, and poured into broad shallow vessels, to crystalize. In some cases, crystalization commenced in twelve hours; in others, not till after several days; and in no case was this process so far completed as to allow the sugar to be drained in less than three weeks from the time of boiling. The reason why so great a length of time was required I have not yet been able to discover. There is no doubt but that an improved process of manufacture will cause it to granulate as quickly as any other.

Enough has been said to enable any one so disposed to manufacture sugar from maize.

As to the profits of the business, I shall make no positive assertions; experience on the subject is yet too limited to warrant them; and, as all the facts in relation to it are now before the public, every one interested can draw his own conclusions. It is said, by those acquainted with the cultivation of the cane, that that business cannot be carried on profitably on less than one hundred acres in crop; and that attempts on a small scale will be certain to fail, with a great loss of time and labor. How far this may be applicable to corn remains to be seen.

Some comparison between the cultivation of cane and that of corn may perhaps be interesting.

The cane lands in Louisiana are redeemed to agriculture by strong embankments along the river, and by numerous ditches, which extend back into the swamp to a considerable distance beyond the line of cultivation. The ground is still further divided, by smaller ditches, into lots of from one to two acres in extent. It is extremely rich and productive, but the expense of draining and keeping up the embankments must be considerable; this forms the first difference to be noted in the culture of the two plants under consideration.

The best season for planting cane in Louisiana is in the fall, which is also the time of harvest, when labor is the most valuable, and the greatest exertions are required to secure the crop before it is destroyed by frost.

But the most striking difference will be found in the cost of seed, and in the labor of planting. The cane is propagated by layers; these are partly furnished from the tops of the plants, when cut for grinding, but are principally ratoons. Of the latter, it requires the produce of one acre to plant three. The grain from one acre of corn will be sufficient for planting forty acres; therefore, the difference in the expense for seed will be as one to thirteen.

In planting cane, furrows are made with the plough from two and a half to three feet apart; in these the layers are placed, in a double row, and the earth drawn over them, with hoes, to the depth of three or four inches.

In the spring, before the plants are up, this covering is partly scraped off, so as to leave them buried from one to two inches. From this account, it is evident that no more manual labor will be required to drill fifty acres in corn, than to plant one acre in cane. The labor of cultivating the latter plant during its growth is also greater, but this may be balanced by the extra work required to take off the embryo ears from the corn. When cultivated in the mode recommended, the stalk of corn is soft, remarkably heavy, and full of juice from bottom to top. The amount of power required for grinding them must be much less than is necessary for cane, or, what is the same thing, an equal power will do it with greater rapidity. The average yield of cane, in Louisiana, is one thousand pounds of sugar and forty-five gallons of molasses per acre. From the above comparative statement, it would appear that one-half this

amount of crop from corn would be equally, if not more, profitable.

I will only add, in conclusion, that whether or not the sugar from the cornstalk may soon become an article of profitable export, its manufacture in the simplest form will enable every family to supply themselves with this article for common use, now become so much a necessary of life, and thus save a considerable bill of expense yearly paid for foreign sugars.

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*Extract from Annales de la Société Polytechnique Practique, No. 22, for October, 1839.**

Sugar of Corn.—There is no plant of greater general interest or utility than Indian corn. It can serve, under a great variety of different forms for the nourishment of man and the domestic animals, and, above all, the application of industrious science.

In reference to its saccharine qualities, maize has not been sufficiently appreciated. Travelers report that under the tropics the stalk of this plant is so very saccharine that the Indians suck it, as in other places they do the sugar cane. M. Pallas, who has made a great many researches on this application of maize, has arrived at a remarkable result: he has found by many experiments, both in France and more recently in Africa, that this vegetable, by a simple modification applied to its culture, is able to furnish a much more considerable quantity of sugar than by the ordinary method. This method consists in detaching from the plant, immediately after the foundation of the ovaries, (after the plant has tasseled,) the young ear, and to leave it to develope itself, thus deprived of its fruit. Arrived at maturity, the stalk of Indian corn contains crystalizable sugar, in quantity very often double that obtained when the plant is left to mature with the grain. In fact, by the ordinary mode of culture, the grain is nourished at the expense of the sugar in the stalk, as it absorbs a great quantity of this immediate principle, which, by the process of nutrition, is converted into starch. On the other hand, if the young ears are immediately destroyed, the sugar intended to nourish them remains in them, where it accumulates, and the maize plant is thus converted into a true sugar cane, while the fibrous part can be manufactured into paper.

The quantity of sugar is so very great in the stalk of the maize, deprived of the ear, that the pith of this vegetable retains a sensible flavor of sugar, even after it has been dried, as is easily proved by examining the specimens deposited by M. Pallas in the bureau of the Academy of Science. These results are so important as to merit experiments on a grander scale, which may obtain thus for France a source of new industry in the manufacture of sugar.

No. 4.

Dear Sir: Your favor is duly received. You request to know the best method of crystalizing corn sirup, and I know of no more ready method to afford the information required than to detail the entire mode which should be pursued for its manufacture:

1st. To cut the cane as ripe as possible, but before any acetic acid is formed; litmus paper, touched to the fresh-cut cane, will turn red if acid.

2d. Express the juice without loss of time, as every moment after cutting will deteriorate its quality.

3d. A small quantity of clear lime water (say one quart to a hundred gallons of juice) should be added the moment it is expressed, unless the juice shows acidity with litmus paper; in that case, no lime should be used, but a solution of sal soda, or soda ash, should be added, until it is precisely neutral.

4th. When the juice is neutral free from excess of acid or alkali) it should be evaporated in such an apparatus as would finish its charge in 30 minutes; if the boiling power is too small, good crystallization cannot possibly be obtained.

The whole time occupied from the cutting of the cane to finishing its boiling should not exceed one hour.

5th. *To know when the boiling is finished*, place a thermometer in the kettle, and continue to evaporate until it stands at 230° Farenheit.—If, when placed to run off after cooling, it should be found too freely boiled, the next time boil to 240°, or, if too light to run off, to 238°, and so on.

6th. The kettle or boiler should be so arranged that the moment it is done its charge should be thrown into a cooler, capable of holding a number of charges. The first charge should be left in the cooler, with stirring, until the second charge is thrown in; then with an oar scrape the crystals found on the side and bottom of the cooler loose, and gently stir the whole mass together, (the less stirred the better,) so continue, at the letting in of each charge, to stir gently; and when all is in the cooler, let the whole stand until it cools down to 175°; then fill out into sugar moulds of a capacity not less than 14 gallons.—When cooled in the mould sufficient, (say fourteen hours,) pull the plug out of the bottom of the mould, and insert a sharp point, nearly as large as the hole, some six inches; withdraw the point, and stand the mould on a pot to drip.

7th. If the sugar is intended to be brown, leaving it standing on the spot for a sufficient length of time, in a temperature of 80°, will run off its molasses, and leave it in a merchantable shape; it will probably require twenty days. It can then be thrown out of the moulds, and will be fit for use. When moulds cannot be obtained, conical vessels of wood or metal, with a hole at the apex, will answer equally well.

The above description will be sufficient for any operator, if strictly followed; but should any of your friends wish to make the experiment on a large scale, or to produce white instead of brown sugar at a single operation, they had better see me personally before commencing, as the kind of

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* Translated at the Patent Office, and highly confirmatory of Mr. Webb's essay. H. L ELLSWORTH.

kettle, and many other minor particulars, will be important. The above description, however, is fully sufficient for the use of the farmer. If the juice of cornstalks be manufactured with the rapidity named in the former part of this letter, no clarification will be necessary, and scum, which may rise during the boiling, can be taken off with a skimmer; but in the *large way* both clarification and filtration would be requisite, as in large operations every part of the kettle cannot be got at to skim. Since I last saw you, I have made some experiments on the cornstalk; and if your statements are correct as to the quantity of juice which can be obtained from the acre, then there can be no doubt of its entire superiority over the sugar cane. I fear, however, that the enthusiasm of those who made the experiments you spoke of, has led them into errors. It is true that the juice of the cornstalk, grown with a view to sugar making, will yield a juice at 10° Beaumè. I have arrangements to try the experiments fully in the coming summer, and when done will communicate the result.

I remain, sir, yours, respectfully,
J. J. MAPES.

Hon. H. L. ELLSWORTH.

No. 5.

NORTHAMPTON, (Mass.) October 1, 1842.

DEAR SIR: Some time ago I intimated to you that I should furnish you with an account of the cultivation of broomcorn in this region. Such an account I now enclose.

Respectfully, I am
Your obedient servant,
WILLIAM ALLEN.

Hon. H. L. ELLSWORTH,
Commissioner of Patents.

BROOMCORN.

Of the genus sorghum (broom grass) there are four or five species. *Sorghum saccharatum* is the broomcorn, abundantly cultivated in this country, both for the seed and for its large panicles, which are made into the brooms. The whole plant is saccharine. Attempts have been made in France to extract sugar from it, but with little success.

The other species are the following: *Sorghum dora*, (or holcus dora,) common Indian millet, a native of the East Indies, but cultivated in the south of Europe, *s. bicolor*, or two-colored Indian millet, *s. caffrorum*, caffres Indian millet, and *s. nigrum*, coal-black Indian millet.

Of the *sorghum saccharatum*, (or *holcus saccharatus*,) broomcorn, there are several *varieties* raised in Hampshire county, Massachusetts, in the valley of the Connecticut river, principally in the broad meadows of Northampton, Hadley, and Hatfield. The *pine tree* kind is regarded as the poorest kind, or the least advantageous for cultivation; yet, as it is the earliest, (being three weeks earlier than the large kind,) in a short season, when its seeds will ripen, while the seeds of the other kinds fail to ripen, this may prove the most profitable crop. The North river crop is ordinarily the best crop; it is ten days earlier than the large kind, and yields about 720 pounds of the *brush* per acre—the brush meaning the dried *panicles*, cleaned of the seed, with eight or twelve inches of the stalk. The New Jersey, or *large kind*, yields a thousand or eleven hundred pounds of brush per acre. The stalks and seed are large. In good seasons, this is the most profitable crop. But in the present season, (1842,) owing to an early frost, (about September 23,) much of the seed of this kind will fail to ripen. There is also the *Shirley or black brush*. Soil rich, alluvial lands are best adapted for the broomcorn, more especially if warmly situated, protected by hills, and well manured.

Method of Planting.—The broomcorn is planted in rows, about 2½ or 3 feet apart, so that a horse may pass between them with a plough, or cultivator, or harrow. The hills in each row are from 18 inches to 2 feet apart, or farther, according to the quality of the soil. The quantity of seed to be planted is estimated very differently by different farmers—some say that half a peck is enough per acre, while others plant half a bushel, and some a bushel, in order to make it sure that the land shall be well stocked. The rule with some is to cast a tea spoonful, or 30 or 40 seeds, in a hill; the manure at the time of planting should be put into the hill, and old manure or compost is preferred, as being most free from worms.

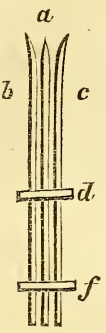
Cultivation—The broomcorn should be ploughed and hoed three times—the last time when about three feet high, though some hoe it when it is six feet high, and when they are concealed by it as they are toiling in the field. The number of stalks in a hill should be from seven to ten. If there are only five or six stalks, they will be larger and coarser; if there are about eight, the brush will be finer and more valuable. In the first hoeing, the supernumerary stalks should be pulled up.

Harvesting.—As the frost kills the seed, the broomcorn is harvested at the commencement of the first frost. The long stalks are bent down at two or two and a half feet from the ground; and by laying those of two rows across each other obliquely, a kind of table is made by every two rows, with a passage between each table, for the convenience of harvesting. After drying for a few days, the brush is cut, leaving of the stalks from six to twelve inches. The longer it is cut, of course, the more it will weigh; and, if the purchaser does not object, the benefit will accrue to the farmer. However, the dry stalk weighs but little; if its weight is excessive, the purchaser sometimes requires a deduction from the weight. As it is cut, it is spread on the *tables*, still farther to dry. As it is carried into the barn, some bind it in sheaves; and this is a great convenience for the further operation of extracting the seed. Others throw the brush into the cart or wagon, unbound.

Scraping.—The process of extracting the seed is called "scraping the brush." Two iron horizontal scrapers are prepared—one moveable, to be elevated a little, so that a handful of brush may be introduced between them. The upper scraper is then pressed down with one hand, and the brush drawn through with the other, the seed being scraped off. This is the old method. A newly invented scraper is superseding the old one. It is an upright instrument, of elastic wood or steel, inserted in a bench of a convenient height for the operator.

The form is as follows:

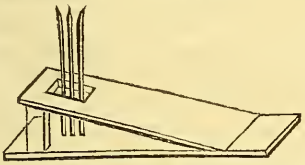
a is a piece of wood or steel, immoveable; *b* and *c* are pieces which are *elastic*, moveable to the right and left at the top, but fastened to the central piece below. The degree of elasticity may be regulated by wedges in the planks *d* and *f*—wedges in the hole through which the pieces pass.



A quantity of brush is taken in the hand, and brought down upon the top of this instrument.—As it is forced down, and drawn towards the body, it separates the elastic sticks from the central piece, but their elasticity presses sufficiently on the brush, so that the seed is scraped off.

The advantage of this scraper is, that both hands may be applied to the brush, instead of only one hand, as in the other kind, and the elastic power of nature is substituted for the pressure of one of the hands. The instrument also seems to double the scraping surface. The instrument was invented at Hartford. I have been told it has not been patented.

The following plan may therefore be useful.—The operator stands at the end A.



The lower plank may rest on the barn floor, or have short legs. The upper oblique has a hole, through which the scraper passes, and down which the seed may fall. Each side of the instrument, a wedge may be inserted, to regulate its elasticity, or by some other contrivance this object may be secured. In scraping, the panicles must first be laid evenly together, and the stalks taken in the hand. If this is not done in the field, and bundles not formed, then must it be done with considerable labor at *the time* of scraping in the barn.

Product.—A common crop is 700 to 800 pounds per acre. There have been raised 1,000 and 1,100 pounds per acre, with 80 to 100 bushels of seed. The large kind grows eleven feet high.

Value of the crop.—About the year 1836 or 1837, the brush sold for 12½ cents a pound; and one farmer in Northampton sold his crop standing, unharvested, at one hundred dollars per acre.—Since then, the price has been decreasing. This year it has been four and five cents. At six cents, the farmer, for 800 pounds, gets $48 an acre, besides 60 or 70 bushels of seed, worth a third of dollar a bushel—so that he receives $70 or upwards from an acre.

Good farmers regard the seed alone as equal to a crop of oats from the same land. Some land owners have rented their land for broom corn, at $25 per acre, they putting on five or six loads of manure.

One farmer, who a few years ago, cultivated 50 acres in broom corn, must have had an almost unequalled income for a New England farmer.

Quantity.—In Northampton, probably 200 acres are raised; in Hatfield, 300; in Hadley, 400; in other towns, Whateley, Deerfield, Greenfield, Easthampton, Southampton, South Hadley, Springfield, and Longmeadow, perhaps 300 or 400 acres more; in all, in the valley of the Connecticut, 1,200 or 1,300 acres; the product, in brush and seed, worth $1,000,000.

Manufacture of brooms.—Individuals tie up brooms with wire or twine. The expense is greater for materials and labor when wire is used.

The turned broom handles cost, as delivered, only one dollar a hundred—one cent each. The expense of other materials and labor in making a broom is 6 cents, or on the whole about seven cents. In a good broom, a pound and a half of brush is employed, which at the present price of 5 cents, would be 7½ cents, so that a broom made with wire costs now about 14½ cents. A manufacturer recently went to Boston, and could get an offer of only 12 cents, or 12 dollars per hundred, for his brooms; at which rate he could not afford to sell them, and chose to retain them. Brooms are made with brush weighing ¾ of a pound, 1 pound, 1¼ pound, and 1½ pound. The brush is whitened by the manufacturer. It is placed in a large tight box, and bleached by the fumes of sulphur; but this process is said to weaken the brush. Who would think of whitening broom brush, for beauty? Thus it is that fashion descends into the vale of life, and to the humblest of concerns. Why should not the housemaid wield a beautiful broom, with white brush and variously interlaced wire, and polished and variously colored handle?

Miscellaneous.—A few remarks will be added, some of which were omitted in their proper places. If the stalks are cut before the seed is ripe, they are better, stronger, more durable, than if cut after the seed is ripe. In this case, the farmer would lose the value of the seed. He of course will not submit to this loss, unless it is made up to him by the increased price of the brush.

The seed is used for feeding horses, cattle, and swine. It is ground and mixed with Indian meal, and is regarded as excellent food—it weighs forty pounds a bushel.

Mr. Shipman of Hadley, is the greatest manufacturer of brooms in the valley of the Connecticut. If he employs, on an average, ten hands, and each hand makes 25 brooms per day, the number made in a year would be 78,000. It is said he has made 100,000.

The brush, when it is put in the barn, should be placed on a scaffold, so as to be exposed to a circulation of the air, that it may dry, and not mould. For all the purposes of use, a broom made with twine is equal to one made with wire; and a man can make several more of them in a day.

Mr. Shipman uses 300 or 400 pounds of large twine, at 20 to 30 cents a pound, and 2000 pounds of small twine, at 31 cents. Perhaps he manufactures only an eighth part of the brooms manufactured in Hadley.

At the price of 20 cents, the price of brooms a few years ago, the broom manufacture of Hadley would thus amount to $160,000.

It is probable that the extended cultivation of the broomcorn will reduce the profits on this product to the average profits of good farming.

No. 6.

CLEVELAND, (O.,) December 7, 1842.

DEAR SIR: The manufacture of pot and pearl ashes is a very important item in the clearing of land in a new timbered country, and is of great importance to the new settler, being obtained previous to getting a crop from his land.

From an experience in the manufacture of ashes for twenty years in the northern part of Ohio, I think the manufacture of pearl ashes is best adapted to a new country. In most cases, the best economy for the farmer is to leach and boil his lye into salts, and sell them to the manufacturer in the form of black salts, which is simply by setting up leaches, putting in a loose bottom raised one or one and a half inches each above the tight bottom, on this a layer of straw, fill the leach with ashes, and use hot water. Boil the lye in kettles or pans until it crystallizes dry. These black salts find a ready market with the manufacturer of pearl ashes.

House ashes are much preferable for manufacture of pearl ashes. In manufacturing pot ashes, lime should be used freely in the bottom of the leach; and it is well to put lime in the water, and boiled, to wet down the ashes in the leach. The lye is boiled in kettles, and melted in pot ash kettles.

Cleveland affords quite an extensive market for pearl ashes and scorched salts. The pearl ashes are used in flint glass and sal-eratus manufactures; scorched salts for manufacture of window glass. Scorched salts are made by simply burning the black salts in the oven once.

Our domestic markets net the best price to the manufacturer until supplied.

Cast iron pans, for evaporators, effect much saving in fuel and labor; they may be found in Cleveland. They are made, say 3 feet broad, 4½ long and 7 inches deep.

Pot ash kettles, of improved shapes and quality, are also made at Cleveland, which are pronounced very superior by those who have used them.

Should you deem any further information on the subject of manufacturing of importance to western settlers, please write such questions as you wish answered.

Yours, very respectfully, W. A. OTIS.

H. L. ELLSWORTH.

No. 7.

FORT WAYNE, December 31, 1842.

SIR: I received your letter the last mail, requesting me to give you some information on the production of ashes, which I will according to the best of my judgement, and my experience the past season has been considerable.

Your first question is, *How many bushels* of ashes can be gathered from one acre of good timber? Answer. From *seventy-five to one hundred and fifty;* and every *four hundred bushels* of ashes carefully saved will produce one *ton* of pot ash or pearl ash.

A very safe calculation is *five hundred pounds* of pot or pearl ash to one acre of good timber, that at the present time is worth twenty-five dollars. I believe that the ashes off the first crop of good timber land is the most profitable one, as times are at present. A man would want about $100 worth of pot ash kettles to begin with, which would be the principal expense, except his own labor. He could have a very quick return; *ashes can be turned into pot ash in thirty-six hours.*

Respectfully yours,

H. WORK.

Hon. H. L. ELLSWORTH.

N. B. I wish you would send me the most approved plan for making lard oil as early as possible, and any information that I can give you at any time, I will do it with pleasure. H. W.

No. 8.

KENSINGTON, PHILADELPHIA, January 8, 1843.

SIR: In answer to your enquiries upon the subject of converting lard into oil, and also into concrete forms for the manufacture of candles, I hasten to say, that, having been and still continuing very much engaged in chemical processes upon lard, I am not able, in the short time I can devote to the subject of your letter, to give you the ample information which is desirable, and which, if more at leisure, I could readily furnish. I however write off, *currente calamo*, the result of some of my experiments in this branch of inquiry, which perhaps may be serviceable. The article of lard offered for sale in the market for domestic use, and now about to be so much in demand as material for the manufacture of lard oil and candles, is prepared from the adipose matter of the omentum and mesentery of the hog, by freeing it with the hand from the membraneous substance connected with it, washing with water until colorless, and melting with moderate heat, continued until the dissipation of all moisture, which fact is known by the transparency of the melted matter, and the absence of *crepitacula*, when small portions are thrown on burning coals.

The chief source of this article is the west, from whence it is brought in kegs of from 40 to 80 pounds each; when fine, it is perfectly white in appearance, and rather inodorous, nearly tasteless, and, at moderate temperature, of a soft consistence, insoluble in water, and but partially so in alcohol. When exposed to the air, it becomes rancid by the absorption of oxygen; this rancidity, engendering a liability to injurious reaction, renders it unfit, in that state, to be used in pharmacy as an ingredient of cerates and ointments, of which it forms the principal part. For this purpose, therefore, it should be kept in close vessels free from contact of air.

Lard as well as nearly all other fixed oils and fats are composed of three proximate principles—two solid, called stearin (from στ'εαρ, tallow) and margarin, (from μαργαριτης a pearl,) and one liquid, of which there are two varieties, called olein (from ελαιον, oil.)

Stearin characterizes, for the most part, animal fats. Margarin, vegetable and olein, is almost universally present in both. The two first are essentially different from each other. Margarin is distinguished by its greater fusibility, its being more soluble in cold ethers, and the necessity of

evaporation to procure it from such solution, while the stearin drops spontaneously during refrigeration.

Berzelius thinks these principles not identical in different oils, as their points of congelation and liquefaction vary according to the substance from which they are derived. Pelouze and Boudet, however, attribute the variable fusibility of the margarin and stearin of fats to the existence of definite combinations of margarin and stearin, respectively, with olein; and think that each of these principles, in a state of purity, is probably the same, from whatever source obtained; and to prove which they assert having found the same margarin in palm oil as in human fat. But in oils, and particularly the vegetable, their investigations evinced the presence of two oleins, distinctive in their characters; one more soluble in different menstrua than the other, and with a less proportion of hydrogen, besides other properties inherent in the one not possessed by the other, more than the mention of which would occupy too much space and time.

The ultimate principles of fixed oils are carbon, hydrogen, and oxygen; the hydrogen being in much larger proportions than is necessary to form water. To this predominance of hydrogen is attributed the readiness with which they burn with flame; that property procuring for them all their usefulness as means of illumination or artificial light.

Stearin, the first named of the constituents of oil and fatty matters, is a concrete white substance, insipid and without smell, fusible at 110° Farenheit, insoluble in water and but partially so in alcohol.

Margarin, present in lard and most other fats, and forming by far the greater portion of olive oil, is more fusible than stearin, and, as its name indicates, of a pearly appearance, possessing also other properties different from stearin, mention of which has been made above. Olein, the oily principle formerly called elain, when pure is quite colorless, and in some degree has the appearance of vegetable oil, liquid at 60° and congealing at 32° Farenheit, and, though not becoming rancid by exposure, acquires viscidity. The relative proportions of all these three principals are different in different fats.

Nearly all kinds of fat, under proper circumstances, are capable of combination with alkali; by which union the principles thereof are changed. By this reäction, they undergo *saponification*, and are transmuted, not by the absorption of any foreign substance, but by the union of the elements of a small portion of water into three peculiar acids, *stearic*, *margaric*, and *oleic*, which unite with the salifiable base and into a peculiar sweet principle glycerin, (from γλυκυς, sweet,) which, in remaining behind, is not saponified. Of this sweet principle, there are formed about three during the saponification of every one hundred parts of lard or tallow.

Hog's lard, in its natural state, Chevreul says, has not the property of combining with alkalis, but acquires it by experiencing some change in the proportion of its elements. This change being induced by the action of the alkali, it follows that the bodies of the new formation must have a decided affinity for that species of body which has determined it. These acids, generated during saponification by the action of the alkali, called adipose or saponic acids, are, when *solid*, in appearance like wax, or spermaceti; when *liquid*, they appear as their oils, mostly fusible at temperatures below 212° Farenheit.

The oleic, being generally mixed with that portion of margaric, which is liquid at the time and temperature of its preparation, is used sometimes as lamp oil, but mostly for the manufacture of soaps, while the remaining small portion of margaric, being of a consistence sufficient to retain it with the stearic, is allowed to remain with that body, which, when used for candles, experiences no great disadvantage by its presence. Stearic, the most important, and by far the most characteristic product of the saponification of lard, tallow, and other not easily fusible fats, is the one of which, at your request, I am to speak in detail —an article, the use of which for making candles bids fair to be in this country most extensive. The consequence which this branch of manufacture is about to assume, is no greater than its merits should obtain for it. Independent of all other advantages, the great reduction which it will occasion in the price of an article of such general and necessary use in domestic economy is alone sufficient to procure the attention which the subject will and does receive. Inferior in no degree to sperm, both as regards quality and appearance, the stearin candles have the advantage of greater cheapness, as they can be made, even by the English mode, hereafter given, at a cost of at least 20 per cent. less than sperm. The increasing importance of this subject induced my attention to it some eight or ten months previous; since which period my whole time has been devoted to its examination. The result of my investigation is a process entirely different from all others, to be executed with so much facility, and with so little cost of time, money, and labor, that I expect to make by it candles, in appearance and quality, as perfect and good, if not better, than sperm, and which, when *retailed*, even at as low a price as 18¾ cents per pound, will afford a remunerating profit to the manufacturers, and a profitable commission to the vender. I mention this price in consideration of the present rates of lard, the supply of which, owing to the unexpected requisition for this purpose, is at present totally inadequate. When, however, this is removed by the increased supply which the producers will see it is their interest to furnish, the price of the material will be in a few years much lower—this, and the improvements which by that time I shall have made in my mode, will, I expect, enable me to manufacture candles at a price so reduced as to entitle them, when these superior properties are considered, to the substitution for the much used but unpleasant mould and dipped candles.

I would willingly communicate fully the manner of conducting the process, but, having been at a great expense of time, money, and anxiety, I have determined to remunerate myself by carrying it into practice; and, for this purpose, I am now arranging apartments in my laboratory, and hope, by the coming spring, to have for sale, in quantities, candles as good or better than the sample I sent you some weeks since.

I have spoken of lard, because this article will,

without doubt, be the material from which to make these candles, both on account of the facility with which it can be produced in quantities, its comparative cheapness, and the profit on its oil, yielded in a preparatory stage of the process for manufacturing the stearic acid, of the substance of which the candles are made. This oil, now largely in use, under the name of lard oil, is nearly pure oleic, its only admixture being small portions of margarin and stearin, with which it becomes connected during preparation.

Its great superiority over sperm oil has caused it to be extensively substituted for that article, for lubricating the joints of machinery, and for manufacturing purposes generally. As a burning fluid, it has proved itself equally good; and in corroboration of this is my experiment with lamps of eight ounces capacity, previously cleaned and new-wicked for the purpose. This experiment was frequently repeated, with the same results. In one lamp was pure sperm; in the other lard oil, of only a fair quality, burned under the same circumstances. The consumption of oil in both was equal; the quantity of light equal; the flame was different, that of the lard oil being of a reddish hue, and not so transparent as sperm. The lamps were of glass, and such as are ordinarily used for burning common oils. There is an erroneous idea abroad, that it requires lamps of a peculiar construction to consume this oil. It is not so; for I use in the laboratory lamps of the commonest make. If, however, the notion will be persisted in, instead of purchasing an expensive burner, all that is necessary is to have substituted, by any coppersmith, for your tin tubes in the lamps you may have those of copper, filed off quite thin at the top, where the wick projects through, so as to prevent the passing off of too much heat; then the lamp will answer to burn lard as well as oil. The price of lard oil being at all times about 25 cents less per gallon than fair sperm, and being equally good, preference should therefore be given to it, both because of its economy and of being a domestic production. It may be as well to mention that there are lard oils of various qualities—that prepared from dark-burned lard is not so good for *burning*, because of its causing, after several hours' burning, a crust on the wick; and, as there has been a quantity of this kind of lard in market, and bought for manufacturing the oil, it is not surprising that there should be a slight prejudice against it as a burning fluid. This prejudice, however, is always removed by the use of that made from pure white lard.

It may be as well to say here some few words in relation to the burning of the lard. To further the consumption of this article, there has been introduced, by persons having at heart their own more then the interest of the community, an expensive lamp, which they advertise as being peculiarly adapted for this purpose. The substitute of lard for *its* oil possesses no advantage, either as regards price or convenience; the use of the latter being so economical, and much more cleanly, besides its not requiring additional expense for a peculiar kind of lamp. The liability of these burners to smoke, and other disadvantages, will, upon trial, convince any one of their inconvenience; and, if any other fact or corroboration is requisite, it is only necessary to say that, notwithstanding the grand display of the article in full flame at the last exhibition of the Franklin Institute, and the ample opportunity thereby afforded to judge of their deserts, so destitute were they of merit as not to have elicited even a passing notice or mention from the committee. If, however, lard is preferred to its oil, why go to the unnecessary expense of a new lamp, when any one you may have will answer fully as well, with the tubes altered as above directed? Farther still, in proof of my assertions about the false economy of burning lard in preference to the lard oil, (the lard oil, as my experiment before mentioned proves, being equal to sperm,) I here insert the result of Harris & Co.'s experiments, cut from a Boston paper last week:

To the Public.

As much has been said of late respecting lamps, oil, and lard, the subscribers have caused a very accurate experiment to be made, whereby the economy of oils and lard, producing light in the solar and carcel lamps, might be tested.—These two descriptions of lamps were selected for the purpose, as they may be fairly deemed superior to all others in points of economy and safety. Wishing to satisfy all interested in the subject, and who may not have the conveniences necessary for the test, we shall give particulars of the experiment made November 10, 1842.

The solar lamps, of the same size and construction, and one French carcel lamp, were used.

Time of burning, four hours.

No. 1 denotes a solar lamp filled with whale oil.
No. 2 do solar do sperm oil.
No. 3 do carcel do sperm oil.
No. 4 do solar do hog's lard.

Weight of whale oil, 124 ounces per gallon, quality indifferent.
Weight of sperm oil, 120 ounces per gallon, quality good.

Lard of best quality, fresh and sweet.

Nos.	Length of shadow.	Square inch.	Quantity burnt.	Cost per gallon.	Cost of quantity burnt.	Equal to
No. 1.....	37.2 inch.	1383.84	8.5 oz.	50 cts.	3.42 cts.	3 42-100 cts.
No. 2.....	38.3 "	1466.89	9.5 "	80 "	6.33 "	6 33-100 "
No. 3.....	32.6 "	1062.76	8.25 "	80 "	5.50 "	5 50-100 "
No. 4.....	33.2 "	922.40	9.25 "	8 "	4.62 "	4 62-100 "
	27.25 "					

Each lamp was made to give as much light as possible at the commencement of the experiment, and the strength of shadows then measured. Nos. 1, 2, and 3, maintained the same degree of light during the whole time of burning. The light from No. 4 had perceptibly decreased in 2 hours, and, at the close of the experiment, had receded upwards of 16 per cent. Consequently, the mean quantity of light given during the four hours is taken in estimating their relative powers.

No. 1, (whale oil,) compared with No. 4, (lard,) gave 105 per cent. more light, in proportion to its cost.

No. 1, (whale oil,) compared with No. 3, (sperm oil,) gave 111½ per cent. more light, in proportion to its cost.

No. 1, (whale oil,) compared with No. 2, (sperm oil,) gave 75 per cent. more light, in proportion to its cost.

The following table shows the expense of burning each of the above lamps one hour, omitting fractions of mills, and stating the comparative quantities of light in whole numbers.

No. 1,	8 mills;	light equal to	13.
No. 2,	15 do	do	14.
No. 3,	13 do	do	10.
No. 4,	11 do	do	9.

The results stated in round numbers, showing the cost of each burning a given time, estimating the amount of light, and cost of materials, are as follows:

Whale oil, in solar lamp, argand burner,			100.
Sperm oil,	do	do	175.
Hog's lard,	do	do	205.
Sperm oil, in carcel,	do	do	211.

Much care was taken in weight and measure of the materials, and the judgement of several persons accustomed to such experiments was taken in adjusting the shadows, and the calculations we believe to be correct. This any one can verify, as the elements are all stated above.

We feel justified in recommending *the use of best winter-bleached whale oil in the solar argand lamp,* whereby the best artificial light now in use will be produced.

HARRIS, STANWOOD & CO.

29 Tremont Row, Boston, December, 1842.

The mode now adopted for the preparation of this oil is that of graining the lard in a suitable and well-known manner, by which process the separation of the olein from the stearin is rendered more easy. This separetion is effected by pressing the grained matter, enclosed in canvas bags, by means of a powerful press of proper construction. In this way, all the olein or lard oil is driven out, together with a small portion of margarin and stearin, not, however, in sufficient quantity to injure the oil. What remains in the bags (the stuff of which, after proper preparation, the candles are made) is the white constituent of the lard—stearin, with small portions of margarin and olein, remaining with it; the removal of which (the press not being able to effect) must, in order to procure good candle material, be produced in in some other way. To effect this, I have, (as before stated,) after much trouble and patient investigation, discovered an economical mode, and which (as I intend carrying it into practice immediately) I shall not make known, but will substitute therefor that practiced in England, and which is found to answer admirably—the product thereof having so handsome an appearance, and being of so good a quality as to cause it difficult to distinguish it from the most refined wax. This fact of their handsome appearance is confirmed by the following paragraph, cut from a paper some days since:—

"Accidental Poisoning.—It is well known that a salve, for the cure of chaps and wounds, is often made of virgin wax and oil; and some families, who live at a distance from an apothecary, make this medicine, at the moment it is wanted, by taking a wax candle and melting it into oil.—In employing this remedy, made of a candle, a person is said to have been recently poisoned in France. The reason of it is this: candles are now no longer made of wax, but of suet, from which oil has been extracted to grease wools.—This suet, in order to form candles, is combined with a great quantity of arsenic. It is therefore not astonishing that arsenic, which penetrates even by friction, can have a poisonous effect when applied to the raw flesh."

The advantage which my mode possesses over this is its greater economy, both in cost and time, of preparation, while the product is equally good as that by the English, which is as follows:—Tallow lard, or the solid part of lard, after the separation of its oil or any fat, is boilded with quick lime and water in a large vat, by means of perforated steam pipes distributed over its bottom. After several hours' active boiling, the combination becomes sufficiently complete. The stearate thus formed is allowed to cool, until it becomes a concrete mass. It is then to be dug out, transferred to a suitable vessel, and decomposed by a sufficient quantity of sulphuric acid. This decomposition of the soap, says the patentee, should be made in a large quantity of water, kept well stirred during the operation, and warmed by steam introduced in any convenient way. When the mixture has stood sufficiently long, the acid of the fat or tallow will rise to the surface, and the water, being drawn off, will carry the alkaline or saline matters with it; but if the acids or tallow should retain any portion of the salts, repeated portions of fresh water must be added to it, and the whole well agitated, until the acids have become entirely freed from alkaline matter.

The washed mixture of the three acids—stearic, margaric and oleic—is next drawn off into tin or other suitable pans, and allowed to cool, and then reduced to thin shreds by a tallow cutter—an instrument used by tallow chandlers. The next step is to encase the crushed mass in canvas or caya bags, and then submit it to the action of a powerful hydraulic or the stearic cold process—a machine made for the purpose. By this means a large quantity of the oleic acid is expelled, carrying with it some little of the margaric. The cakes, after considerable pressure, are then taken out, and again subjected to the action of steam and water; after which, the supernatant stearic acid is run off into pans, and cooled. The cakes are then reduced to a coarse mealy powder by a rotary rasping machine, put into strong canvas bags, and submitted to the joint action of steam and pressure, in a hydraulic press of appropriate construction, called Maudlay's stearin cold press.

By these means, the stearic acid is entirely freed from oleic acid. It is then subjected to a final cleansing in a tub with steam, melted, and cooled in clean vessels. These cooled masses, owing to their crystaline texture, are unfit to be made into candles. It is therefore necessary, in some way, to remedy this. The French do so by crushing the masses, and pressing with them small portions of arsenious acid. This, however, is an an injurious and reprehensible admixture, not only on account of the liability of such accidents mentioned in a previous paragraph, but because of the volatility of the arsenious acid, causing the atmosphere, in a room where these candles have been burned, after a short time, to be not only disagreeable but deleterious to inhale.

This assumption of crystaline form I prevent without the use of this poisonous substance, merely by a proper and peculiar arrangement in the concluding part of the process. The wick to be used in the manufacture of these improved candles is to be made of cotton yarn, twisted rather hard, and laid in the same manner as wire is sometimes coiled round the bass strings of musical instruments. For this purpose, straight rods or wires are to be procured, of suitable lengths and diameters, according to the intended size of the candle about to be made; and these wires, having been covered with cotton, coiled around them as described, are to be inserted in the candle moulds as common wicks are; and, when the candle is made and perfectly hard, the wire is to be withdrawn, leaving a hollow cylindrical aperture entirely through the middle of the candle.

I have now given you what information my leisure has allowed me to prepare. I could extend my remarks, but have not now the time.

With the hope that this summary will answer your purpose, I remain yours, respectfully,

CAMPBELL MORFIT,
Manufacturing Analytic Chemist.

No. 9.

Washington, January 18, 1843.

Sir: In answer to your communication of yesterday, I beg leave to say, that, in obedience to instructions received from the general superintendent of light-houses on the lakes, I procured, in the month of November last, a sample of lard oil manufactured in Cleveland, which was used in the light-house at Cleveland as an experiment. It had a fair trial, being placed in the centre lamp; the others were filled with sperm oil. The lard oil was found to give as brilliant a light, and burn equally well with the sperm. During the night, the lamps containing the sperm oil were trimmed twice; the one containing the lard oil was not trimmed. On examining the lights in the morning, at the time for extinguishing the same, the lamp containing the lard oil was found burning equal to those containing the sperm oil.

I have no hesitation in saying that I believe winter-pressed lard oil will burn equal to winter sperm oil.

I have the honor to be, very respectfully, your obedient servant,

WILLIAM MILFORD,
Collector of the Customs, Cleveland, Ohio.
Hon. H. L. Ellsworth,
Commissioner of Patents.

No. 10.

Cleveland, December 29, 1842.

Dear Sir: Yours of the 21st is just received. In answer to your first query, viz: How much lard will a hog make weighing 300 lbs., very fat, after taking out the hams and shoulders?

I would state that there is a great difference in hogs as to their frame and the kind of food they have been fatted upon. The average Ohio hogs (common breeds) will produce, when tried by steam, 50 per centum lard, after deducting the hams and shoulders. The plan now generally adopted is, not to take out the shoulders; the sale for them is limited, and price low; the covering of fat will produce more in lard than the expense of curing would warrant. The mixture of the China and Berkshires, fed upon potatoes or any other vegetable containing starch as a principal food, would produce, when very fat, at least 70 per centum, after taking out *only* the hams.

The steaming apparatus is merely a tub with a false bottom, perforated with holes, lying about two inches above the bottom. The steam is introduced between the two bottoms, and so entirely separates the fat from the cells in which it was enclosed that no pressing of scraps is necessary. The bones, lean, and scrap, are left on the false bottom, and the lard floats on the surface. With steam, at a pressure of 5 lbs. to the inch, it will require from 18 to 20 hours to try off a tubfull of any given quantity, steam in proportion of course; 60 lbs. pressure would do it in one-third the time. The great advantage of steam is, the whole of the lard or tallow is produced, and there is no danger of burning either.

The quality of the lard is good, but not equal to leaf lard or suet; the carcass fat does not contain as much of the concrete principle (stearin.) Whole hog lard cannot be refined and made hard without a portion of the oil is extracted. I take from 20 to 40 per centum of the oil; then the balance goes through several washings in pure *rain water* by steam, after which it is refined lard. The expense is not more than one quarter cent per pound, but it is of more value to us thon common lard, as we have a great deal of trouble and expense with it; and in only extracting a portion of the oil, we would lose by ir, did it not command a better price in the market, which it should from its purity.

I cannot give you any information about the quantity of tallow from beeves, as none have been slaughtered in this section for tallow; they (beeves) must also vary very much in the amount produced, depending upon their feed, &c. The bones are worth at least half a cent per pound to calcine. From them ivory black is made, (worth 2½ cents per pound,) by charring them in close iron vessels.

I used to decompose the lard in acid and neutral salts. When the affinity between the parts is destroyed, I separate them by means of canvas bags placed in powerful screw presses. If I wish to make candles of the residue, the pressure is continued until all the oil, by this means, is forced out. The contents of the bags are then subjected to the action of a powerful hydraulic press, and the stearin pressed to dryness.

To produce the winter oil we have to expose the decomposed lard to the cold, in the same

manner that the crude sperm oil undergoes to produce the winter-strained oil. Upon analysis, it is found that lard oil contains 79 2-10 carbon, and pure sperm oil 79 5-10; making three-tenths of one per centum difference; the other equivalent of hydrogen and oxygen are the same, excepting the difference of the three-tenths. For all uses (except painting) lard oil has no equal. It burns with a strong white light, and is entirely free from either smoke or smell. It does not contain any gelatine, which makes it a preferable article for all kinds of machinery; for wool it answers better than the olive oil, which it has superseded entirely. The oil of tallow is also well adapted for machinery; for burning it is not preferable to other oil, on account of its odor. Tallow only contains about 28 per centum of oil, whereas lard contains on the average 62. The stearin of both lard and tallow makes a better and harder candle than sperm, and the same amount in weight produces a great deal more light.

Since you were here, the works of this company have been increased, and are now running 2,000 pounds per day. Lard is coming in freely; we are paying five cents cash per pound. The oil sells readily at seventy-five cents by the cask, and one dollar at retail per gallon, in competition with some oil from Cincinnati, which is offered at 33⅓ per centum lower.

My process is so entirely different, and the ingredients I use are so effective, that I find no difficulty in purifying the oil and lard after it is manufactured, and in producing a superior article to any other.

Yours, respectfully,

J. R. STAFFORD,

Agent Cleveland Lard Oil and Candle Co.

Hon. H. L. Ellsworth.

No. 11.

Mode of manufacturing elaine and stearine from lard, &c, patented by John H. Smith, No. 122 Front-street, New-York City.

To all whom it may concern:

Be it known that I, John H. Smith, of the city of Brooklyn, in the county of Kings, and State of New-York, have invented a new and useful improvement in the manner of separating, from each other, the elaine and stearine which are contained in lard; by means of which improved process the operation is much facilitated, and the products are obtained in a high degree of purity; and I do hereby declare that the following is a full and exact description thereof.

The first process to be performed upon the lard is that of boiling, which may be effected either by direct application of fire to the kettle, or by means of steam; when the latter is employed, I cause a steam tube to descend from a steam boiler into the vessel, containing the lard; this tube may descend to the bottom of the vessel, and be coiled round on said bottom, so as to present a large heating surface to the lard, provision being made for carrying off the water and waste steam, in a manner well known; but I usually perforate this tube with numerous small holes along the whole of that portion of it which is submersed below the lard, thus allowing the whole of the steam to pass into and through the lard. To operate with advantage, the vessel in which the boiling is effected should be of considerable capacity, holding say from ten to a hundred barrels. The length of time required for boiling will vary much, according to the quality of the lard; that which is fresh may not require to be boiled for more than four or five hours, whilst that which has been long kept may require twelve hours; it is of great importance to the perfecting of the separation of the stearine and elaine, that the boiling should be continued for a considerable period, as above indicated.

My most important improvement in the within described process consists in the employment of alcohol, which I mix with the lard in the kettle, or boiler, at the commencement of the operation. When the lard has become sufficiently fluid, I gradually pour, and stir, into it, about one gallon of alcohol, to every eighty gallons of lard, taking care to incorporate the two as intimately as possible; and this has the effect of causing a very perfect separation of the stearine and elaine from each other by the spontaneous granulation of the former, which takes place when the boiled lard is allowed to cool in a state of rest.

I sometimes combine camphor with the alcohol, dissolving about one-fourth of a pound in each gallon of alcohol which not only gives an agreeable odor to the products but appears to co-operate with the alcohol to effect the object in view; the camphor, however, is not an essential ingredient, and may be omitted. Spirit of lower proof than alcohol may be used, but not with equal benefit.

After the boiling of the lard, with the alcohol, has been continued for a sufficient length of time, the fire is withdrawn, or the supply of steam cut off, and the mass is allowed to cool sufficiently to admit of its being laded, or drawn off, into hogs heads, or other suitable coolers, where it is to be left at perfect rest until it has cooled down, and acquired the ordinary temperature of the atmosphere; as the cooling proceeds, the granulation consequent upon the separation of the stearine and elaine will take place and become perfect. The material is then to be put into bags, and pressed moderately, under a press of any suitable kind, which will cause the elaine to flow out in a great state of purity, there not being contained within it any appreciable portion of the stearine; this pressure is to be continued until the stearine is as dry as it can be made in this way.

The masses of the solid material thus obtained are to be remelted, and in this state to be poured into boxes, or pans, of a capacity of ten or twelve gallons, and allowed to form lumps, which I denominate blocks; these when removed from the vessels, are piled, or stacked, up for a week or ten days, more or less, the room containing it should be at a temperature of nearly eighty, which will cause a sweating, or oozing, from the blocks, and they will improve in quality; the blocks are then to be rolled in clothes, or put into bags and these placed between plates and submitted to very heavy pressure by means of a hydraulic press. After this pressure it is brought again into the form of blocks, and these are to be cut up by means of revolving, or other knives, or cutters. The pieces thus obtained are to be put into bags, and subjected to the action of hot water, or steam, in a press until it becomes hard enough to be manu-

factured into candles, or put up for other purposes to which it may be desired to apply it.

The manner of subjecting it to the action of heated water, or of steam, is to place the bags containing the stearine in a box, or chest, into which heated water, or steam, may be introduced, but not to such extent as to fuse the stearine. A follower is then to be forced against the bags contained in the box or chest, and moderate pressure made upon them; the material will now be found to have acquired all the required hardness, and to possess a wax-like consistence, such as would generally cause it to be mistaken for wax.

I am aware that alcohol has been used for the purpose of separating elaine and stearine from each other in analytical chemistry; but the lard, or other fatty matter consisting of these substances, has, in this case, been dissolved in the heated alcohol, and the whole has been suffered to cool together; this process would be altogether inapplicable to manufacturing purposes, as the cost would exceed the value of the product. In my manufacturing process, instead of dissolving the lard in alcohol, I add a small proportionate quantity of the latter to the former, the whole of which is driven off at an early period of the ebullition, but by its presence, or catalytically, disposes the elaine or stearine, to separate from each other, which they do, after long boiling and subsequent cooling. I do not, therefore, claim the use of alcohol in separating elaine and stearine from each other, by dissolving the fatty matter in heated alcohol, and by subsequently cooling the solution; but what I do claim as my invention, and wish to secure by letters patent, is the within described method of effectively promoting their separation or by incorporating alcohol, or highly rectified spirits, with the lard in small proportionate quantities, say one gallon, more or less, of such alcohol, or spirit, to eighty gallons of lard, and then boiling the mixture for several hours, by which boiling, the whole of the alcohol will be driven off, but will have left the elaine and stearine with a disposition to separate from each other, on subsequent cooling, as herein indicated and made known.

JOHN H. SMITH.

Witness:
T. H. Patterson,
H. S. Fitch.

No. 12.

Erie, (Pennsylvania,) *January* 11, 1843.

Dear Sir: Your favor of the 1st ultimo, making inquiries in relation to the culture, use, and comparative value of rape seed in this section of country, came to hand by due course of mail.

From the best information I have been able to obtain, I reply to your interrogatories, as follows:

1st. Rape seed is raised in this section.

2d. Rich ground will produce from 25 to 40 bushels per acre.

3d. Ten quarts of oil may be obtained from a bushel of seed.

4th. Oil cake is worth per bushel about the same as oats.

5th. The oil is used in burning, and in the manufacture of woolen oil cloth, &c, and is worth from seventy-five cents to one dollar per gallon.

6th. The seed should be sown about the 25th September, *three pints* to the acre. The ground should be well cultivated, and such as does not heave up; harvest in June following. It should be cut with the sickle when the stock is yellow, before it becomes dead ripe, to prevent a waste of seed. Let it lie in swathe about eight days in dry weather, until the seed becomes black and shells easily. It is then put into a wagon, with a cloth in it, to prevent a waste of the seed. Take it to a barn with a tight floor, and thresh the seed; to be spread about four inches thick, and turned every day for eight days, to prevent moulding. Then it is ready for the manufacture of oil. After the oil is pressed, it must be clarified by chemical process, the same as other oil.

7th. It will not answer for painting.

8th. The stem is of no use, except for manure.

9th. Cake answers well for hogs, but better for sheep.

Very respectfully, your obedient servant,

A. SCOTT, *P. M.*

Hon. Henry L. Ellsworth,
Commissioner of Patents, Washington, D. C.

No. 13.

Mode of fencing and ditching, &c.

A good embankment, three feet high, with a ditch, furnishing a drain for surplus water, is made with astonishing rapidity. The embankment affords a foundation for a short post to hold two or three rails, which is found sufficient either to enclose or exclude cattle. The machine to make the embankment need not cost over two dollars, including labor and materials. It may be constructed by any farmer with the help of an axe and auger. It seems almost incredible that two planks 12 feet long, united at an angle of 18 or 20 degrees, can throw up dirt with such facility. The wedge and inclined plane seem united, and the only difficulty is, to ascertain at what angle dirt will slide. The angle above mentioned will answer in most soils. If the angle should prove too obtuse, the brace in the rear might be so formed as to graduate the scraper as desired. If the planks are extended in length, the hight of the embankment may be increased, or the dirt thrown further from the furrow, if the object is to turnpike the soil or to grade it for rails; and it appears that the machine will greatly lessen the expense of making roads on lands where large roots form no obstacle to the common plough, which precedes this scraper. To expedite turning at the end of the furrow, a bent lever, (a crooked joint will answer,) affixed about the centre, will raise the machine so as to turn on a point, and much friction may be saved by tacking to the land side a few inches of plank at the front and rear, or by excavating the land side in the middle, if made from a solid stick.

A plough and scraper might be combined, but the same strength in two teams will be more desirable. When land is dear, the objection might arise that too much is wasted. This, however, will have no weight in the West, where land is plenty. Indeed, some in Europe have urged the benefit of sloping embankments, as they *increase* the surface for grazing, which is an admitted fact, the sides of a hill being greater than its base. An excavation is made on both sides of the embank-

ment. The ditch is eighteen inches only, and the embankment eighteen inches above the common surface, making an elevation from the bottom of the ditch, perpendicularly, of three feet, and giving a slope at 40 degrees, of about four feet—the slope, in some soils, must not be over 30 degrees, which will depend upon the soil. Less than this would expose the bank to crumble by the frost, and more would make the acclivity so small as to permit cattle to ascend it. Nor is the improvement in making the embankment alone worthy of special notice. The posts are bored with despatch by one or more augers propelled by hand or horse-power. The augers are two and a half inches, and these, by two apertures, make a mortise of five by two and a half; but the second hole is bored so as to cut the circumference of the first, to lessen the chip between the two, which is easily removed by a chisel or hatchet. The rails are sharpened by a circular saw, by cutting one side so that when two rails are brought together, they just fit the mortise. The lap of the rails is about six inches, and makes a neat appearance; additional strength is given by pinning the upper rail. If rails are cut twelve feet three inches, four hundred and forty panels will make a mile of fence. This will determine the number of posts which are inserted in a furrow when the fence is to be made six inches deep, before the ditch is commenced; this will save all excavation for posts by hand; and, when the embankment is formed, the posts will be two feet in the ground.

If the team can travel twelve miles per day, this will give six passages on each side of the embankment, and completes one mile in extent in a day.

I will give an estimate of fencing different quantities of land. The size and shape of the tract materially effects the cost per acre.

2 teams, $2 50 each, one day, (one with plough and one with scraper)..	$5 00
1,320 rails sharpened and delivered, at Mr. Robinson's estimate, two cents.....	26 40
440 posts, bored complete, three cents.....	13 60
Setting posts and putting in rails five days.....	5 00
Cost per mile.....	50 00
Add for contingencies twenty-five per cent.	12 50
	62 50

1	section,	640	acres,	4	miles,	cost	$250 00,	which is per acre..... $0 39
½	do.	320	do.	3	do.	do.	187 50,	do. 0 58½
¼	do.	160	do.	2	do.	do.	125 00,	do. 0 78
⅛	do.	80	do.	1½	do.	do.	93 75,	do. 1 17
1-16	do.	40	do.	1	do.	do.	62 50,	do. 1 56
1-32	do.	20	do.	¾	do.	do.	46 87,	do. 2 39
1-64	do.	10	do.	½	do.	do.	35 25,	do. 3 12½

When roads or unoccupied land do not adjoin, the expenses will be reduced, since adjoining proprietors are bound to pay if they improve one-half the value of the fence.

This estimate is made from common prairie land, which is not more than three miles from timber, and where the timber is good for splitting, and not over ten dollars per acre, and where the labor of mauling rails does not exceed seventy-five cents per hundred.

A sketch of the ditch, fence, rails, scraper, and augers, is given. Augers, with sliding cutters, are decidedly preferable. See plate I, figures 1 to 9.

A very simple machine for boring posts may be seen by referring to figure 13, plate II. It may be constructed by an ordinary laborer. Between the uprights the post to be bored is fastened. The auger is changed by raising the piece of scantling, which holds down the same, and runs between two pieces of scantling fastened at one end by a hinge of leather or iron and at the other by a pin. The holes are made to accommodate the wishes of the fence-maker, as to the number and distance of the rails. A 2½ inch auger is recommended, as this with two holes will make a mortise 5 by 2½ inches. Any ordinary auger will answer, if a crank is affixed to the same. The simplicity and utility of this machine will recommend itself.

PLATE I.

Fig. 1. Fence.
Fig. 2. Rails sharpened.
Fig. 3. Auger with cutters.
Fig. 4. Holes bored.
Fig. 5. Post, ditch and embankment.
Figs. 6 and 7. Views of the scraper.
Figs. 8 and 9. Views of the plough.
Fig. 10. Surface of teh ground.

PLATE II.

Fig. 10. Cheap wood mill.
Fig. 11. End view of iron
Fig. 12. Front view of iron mill.
Fig. 13. Post-boring machine.

PLATE I.
Fig. 1.

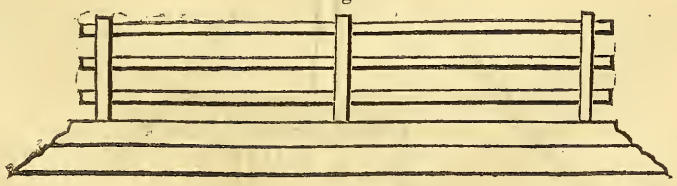


Fig. 2.

Fig. 6.

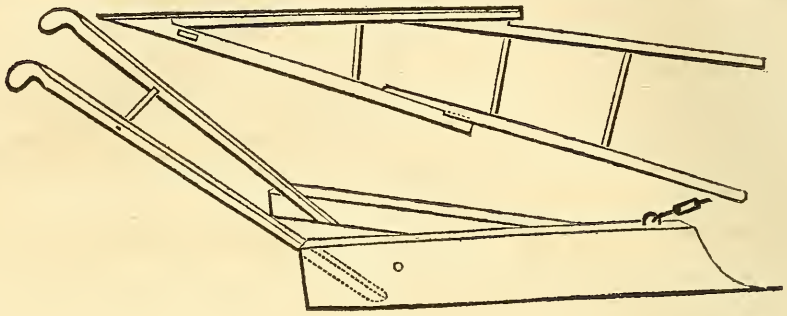


Fig. 7.

Fig. 3. *Fig.* 5. *Fig.* 4.

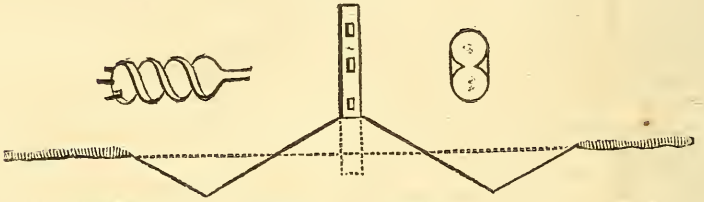


Fig. 8.

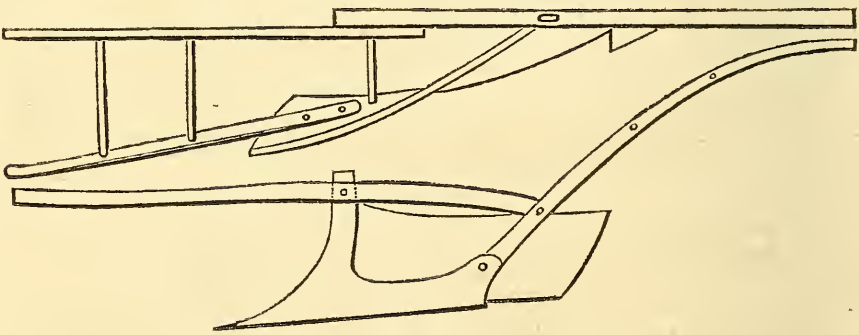


PLATE II.

Fig. 10.

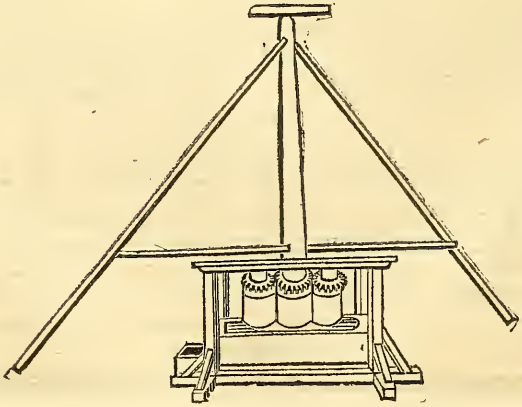


Fig. 11.

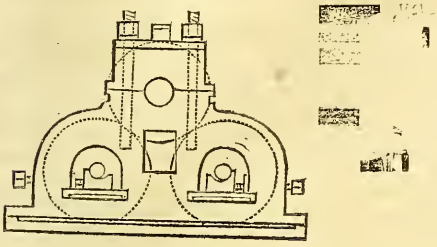


Fig. 12.

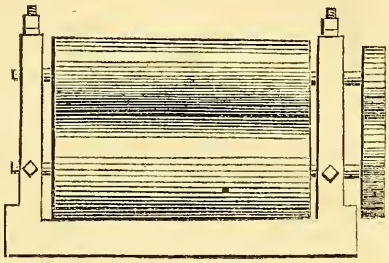
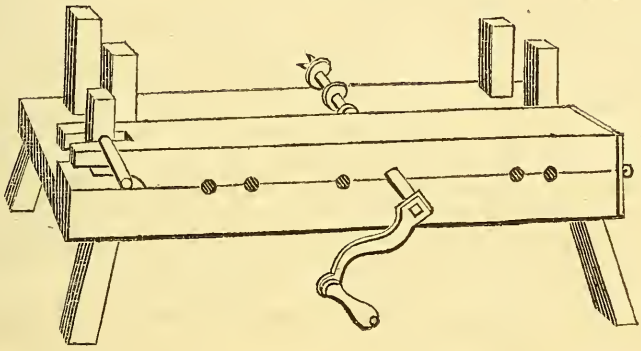


Fig. 13.



No. 14.

LAFAYETTE, TIPPECANOE Co., (INDIANA,)
January 20, 1843.

DEAR SIR: The plan proposed in several of your communications for *ditching* and *fencing* the Western prairies, I feel confident from experiment, will prove eminently successful. In this assertion I am sustained by the opinion of many distinguished farmers in this country, who have examined a "scraper" or "ditcher," modeled on the plan you recommend, and have also witnessed its operations.

A machine designed for similar purposes, but manufactured and worked at a much greater cost, has been extensively used during the past summer in the northern counties of this State, and its employment, as far as I learn, has been attended with signal success.

For ordinary purposes, your ditcher will be preferable, costing as it does only two or three dollars, and requiring only a comparatively small outlay of labor. The cost of the machine above referred to, as used in the northern portion of this State, is several hundred dollars, and it is complicated in its structure.

The free use of ditching machines on the prairies and in the construction of roads will add thousands of dollars yearly to the value of Western lands. Our farmers seem *determined* to ascertain the utility of these inventions by a thorough trial.

With sentiments of respect yours truly,

H. W. ELLSWORTH.

HON. HENRY L. ELLSWORTH.

No. 15.

Plan of cheap cottages.

After selecting a suitable spot of ground, as near the place of building as practicable, let a circle of ten feet or more be described. Let the loam be removed, and the clay dug up one foot thick, or, if clay is not found on the spot, let it be carted in to that depth. Any ordinary clay will answer. Tread this clay over with cattle, and add some straw cut six or eight inches long. After the clay is well tempered with working it with the cattle, the material is duly prepared for the making of brick. A mould is then formed of plank, of the size of the brick desired. In England, they are usually made 18 inches long 1 foot wide, and 9 inches thick. I have found the more convenient size to be 1 foot long, 7 inches wide, and 5 inches thick. The mould should have a bottom. The clay is then placed in the moulds in the same manner that brick moulds are ordinarily filled. A wire or piece of iron hoop will answer very well for striking off the top.—One man will mould about as fast as another can carry away, two moulds being used by him.—The bricks are placed upon the level ground, where they are suffered to dry two days, turning them up edgewise the second day, and then packed in a pile, protected from the rain, and left to dry 10 or 12 days, during which time the foundation of the building can be prepared. If a cellar is desired, this must be formed of stone or brick, one foot above the surface of the ground. For cheap buildings on the prairie, wood sills, 12 or 14 inches wide, may be laid on piles or stones. This will

form a good superstructure. Where lime and small stones abound, grout made of those materials (lime and stones) will answer very well,

In all cases, however, before commencing the walls for the first story, it is very desirable, as well in this case as in walls of brick, *to lay a single course of slate;* this will intercept the dampness so often rising in the walls of brick houses. The wall is laid by placing the brick lengthwise, thus making the wall one foot thick. Ordinary clay, such as is used for clay mortar, will suffice, though a weak mortar of sand and lime, when these articles are cheap, is recommended as affording a more adhesive material for the plaster. The wall may safely be carried up one story, or two or three stories; the division walls may be 7 inches, just the width of the brick. The door and window frames being inserted as the wall proceeds, the building is soon raised. The roof may be shingles or thatch. In either case, *it should project over the sides of the house, and also over the ends, at least two feet, to guard the wall from vertical rains.* The exterior wall is plastered with good lime mortar, and then with a second coat pebble-dashed. The inside is plastered without dashing. The floor may be laid with oak boards, slit, 5 or 6 inches wide, and laid down without jointing or planing, if they are rubbed over with a rough stone after the rooms are finished. Doors of a cheap and neat appearance may be made by taking two single boards of the length or width of the doors; placing these vertically, they will fill the space. Put a wide batten on the bottom and a narrow one on the top, with strips on the side, and a strip in the middle. This door will be a batten door, but presenting two long panels on one side and a smooth surface on the other. If a porch or verandah is wanted, it may be roofed with boards laid with light joints and covered with a thick paper dipped in tar, and then adding a good coat, after sprinkling it with sand from a sand-box or other dish with small holes.

Houses built in this way are dry, warm in winter, and cool in summer, and furnish no retreat for vermin. Such houses can be made by common laborers, if a little carpenter's work is excepted, in a very short time, with a small outlay for materials, exclusive of floors, windows, doors and roof.

The question will naturally arise, Will the wall stand against the rain and frost? I answer, they have stood well in Europe, and the Hon. Mr. Poinsett remarked to me that he had seen them in South America, after having been erected 300 years. Whoever has noticed the rapid absorption of water by a brick that has been burned, will not wonder why brick walls are damp. The burning makes the brick porous, while the unburnt brick is less absorbent; but it is not proposed to present the unburnt brick to the weather. Whoever has erected a building with merchantable brick will at once perceive the large number of soft and yellow brick, partially burned, that it contains—brick that would soon yield to the mouldering influence of frost and storms. Such brick are, however, placed within, beyond the reach of rain, and always kept dry. A good cabin is made by a single room 20 feet square. A better one is 18 feet wide and 24 feet long, cutting off 8 feet on one end for two small rooms, 98 by each.

How easy could a settler erect such a cabin on the Western prairie, where clay is usually found about 15 inches below the surface, and where stone and lime are often both very cheap. The article of brick for chimneys is found to be quite an item of expense in wood-houses. In these mud houses no brick are needed, except for the top of the chimneys, the oven, and casing of the fire-place—though this last might be well dispensed with. A cement, to put around the chimneys, or to fill any other crack, is easily made by a mixture of one part of sand, two of ashes, and three of clay. This soon hardens, and will resist the weather. A little lard or oil may be added, to make the composition still harder.

Such a cottage will be as cheap as a log cabin, less expensive than pine buildings, and durable for centuries. I have tried the experiment in this city, by erecting a building 18 by 54 feet, two stories high, adopting the different suggestions now made. Although many doubted the success of the undertaking, all now admit it has been very successful, and presents a convenient and comfortable building, that appears well to public view, and offers a residence combining as many advantages as a stone, brick, or wood house presents. I will add what Loudon says in his most excellent work, the Encyclopædia of Agriculture, pp. 74 and 75:

"The great art in building an economical cottage is to employ the kind of materials and labor which are cheapest in the given locality. In almost every part of the world the cheapest article of which the walls can be made will be found to be the earth on which the cottage stands, and to make good walls from the earth is the principal part of the rustic or primitive builder.—Soils, with reference to building, may be divided into two classes: clays, loams, and all such soils as can neither be called gravels nor sands, and sands and gravels. The former, whether they are stiff or free, rich or poor, mixed with stones or free from stones, may be formed into walls in one of these modes, viz: in the pise manner, by lumps moulded in boxes, and by compressed blocks. Sandy and gravelly soils may always be made into excellent walls, by forming a frame of boards, leaving a space between the boards of the intended thickness of the wall, and filling this with gravel mixed with lime mortar, or, if this cannot be got, with mortar made of clay and straw.

"In all cases, when walls, either of this class or the former, are built, the foundations should be of stone or brick, and they should be carried up at least a foot above the upper surface of the platform.

"We shall here commence by giving one of the simplest modes of construction, from a work of a very excellent and highly estimable individual, Mr. Denson, of Waterbeach, Cambridgeshire, the author of the Peasant's voice, who built his own cottage in the manner described below:

"*Mode of building the mud walls of cottages in Cambridgeshire.*—After a laborer has dug a sufficient quantity of clay for his purpose, he works it up with straw; he is then proaided with a frame eighteen inches in length, six deep, and

from nine to twelve inches in diameter. In this frame he forms his lumps, in the same manner that a brickmaker forms his bricks: they are then packed up to dry by the weather; that done, they are fit for the use, as a substitute for bricks. On laying the foundation of a cottage, a few layers of brick are necessary, to prevent the lumps from contracting a damp from the earth. The fireplace is lined and the oven is built with bricks. I have known cottagers, where they could get the grant of a piece of ground to build on for themselves, erect a cottage of this description at a cost from £15 to £30. I examined one that was nearly completed, of a superior order: it contained two good lower rooms and a chamber, and was neatly thatched with straw.—It is a warm, firm, and comfortable building, far superior to the one I live in; and my opinion is, that it will last for centuries. The lumps are laid with mortar, they are then plastered, and on the outside once roughcast, which is done by throwing a mixture of water, lime, and small stones, against the walls, before the plaster is dry, which gives them a very handsome appearance. The cottage I examined, cost £33, and took nearly one thousand lumps to complete it. A laborer will make that number in two days. The roofs of cottages of this description are precisely the same as when built with bricks or with a wooden frame. Cow-house sheds, garden walls, and partition fence, are formed with the same materials; but in all cases the tops are covered with straw, which the thatchers perform in a very neat manner."

Denson's Peasant's Voice, p. 31.

No. 16.

Statement of duties now payable on imports by land or inland navigation, into the port of St. John's, L. C., from the United States; also, a statement of prohibited and free goods, March, 1842.

Articles prohibited.—Arms, ammunition, or utensils of war; gunpowder; blubber; base or counterfeit coin; books, first composed or written, or printed in the United Kingdom, and reprinted in any other, *imported for sale*, except books not re-printed in the United Kingdom within twenty years; fish oil; train oil; fish, dried or salted; fins or skins, the produce of creatures living in the sea; tea.

Articles free of duty.—Beef, fresh or salted; beans; peas; Indian corn; grain of all kinds; flour; fish, fresh; live stock of all kinds; garden seeds; potatoes; pork, fresh or salted; packages, containing merchandise subject to duty.

Articles subject to the duty of five per cent. sterling.—Ashes, pot or pearl; bread and biscuit; cotton; wool; diamonds; flax and tow; fruit and vegetables, green; hemp; hams and bacon; hay and straw; raw hides; drugs; meal; mutton, fresh; all fresh meat not herein declared to be free; rice, rosin, tallow, shingles, staves, veneers, and mahogany; wood and lumber of all descriptions; cassia; spirits turpentine; gum shellac; gum copal; varnish; palm oil; bitter almonds; gums; isinglass; chemical oils; red and white lead; sago; tamarinds.

Articles subject to the duty of seven and one-half per cent., with addition of ten per cent. (ad valorem) to invoice.—Anchovies; alabaster; argol; aniseed; amber; almonds; brimstone; bartago; box-wood; currants; capers; cascucoo; cummin seed; coral; cork; cinnabar; dates, every stone; fruits, preserved in sugar or brandy; figs; honey; iron, in bars, unwrought; pig iron; juniper berries; incense of frankincense; lava and Malta stone, for building; lentils; medals; marble, rough and worked; mosaic work; musk; macaroni; nuts of all kinds; ostrich feathers; oil of olives; oil of almonds, orris root; ochres; orange buds and peel; olives; pitch; pickles; paintings; prints; pazzalona; pumice stone; punk; parmesan cheese; pearls; precious stones, except diamonds; quicksilver; raisins; sausages; sponge; tar, turpentine; vermillion; vermicelli; whetstones; gum; essences of bergamot, lemons, roses, citron, oranges, lavender, and rosemary.

Articles subject to the duty of fifteen per cent. ad valorem.—All goods, wares, and merchandize, not otherwise specified in tariff, and not herein declared to be free of duty. We mention a few of the imports paying fifteen per cent. duty:—combs, cheese, butter, lard, leather, allspice, pepper, ginger, pimento, hardware, castings, clay, earthen ware, wooden ware, chairs, furniture, beds, baskets, worsted and woollen manufactures, oysters, machinery, medicines, furs and skins, jewelry, cutlery, brooms, brushes, bristles, canary seed, &c.

Articles subject to the twenty per cent. ad valorem.—Cotton, and cotton manufactures; glass, and glass manufactures; sugar candy; soap; cigars.

Articles subject to the duty of thirty per cent. ad valorem.—Books; paper, and paper manufactures; clocks and watches; leather manufactures; linen, and linen manufactures; musical instruments; wires, of all sorts; silk, and silk manufactures.

Articles subject to different duties.—Salt, per 280 lbs. 2*s.* 6*d.* sterling; indigo, 6*d.* sterling per pound, or fifteen per cent.; tobacco, leaf, 1*d.* sterling per pound, or fifteen per cent.; tobacco, manufactured, 2*d.* sterling per pound, or twenty per cent.; snuff, 2*d.* sterling per pound, or twenty per cent.; sugar, refined, 2*d.* sterling per pound, or twenty per cent.; sugar, raw, 1*d.* sterling per pound, or 5*s.* sterling per cwt.; coffee, green, 2*d.* sterling per pound, and 5*s.* sterling per cwt.; coffee, ground, 4*d.* sterling per pound, and 5*s.* sterling per cwt.; coffee, roasted, 5*s.* sterling per cwt., and 5 per cent.; cocoa, 5*s.* sterling per cwt., and 5 per cent.; molasses, 1*d.* sterling per gallon, and 4*s.* 6*d.* sterling per cwt.; sirups, 1*d.* sterling per gallon, and 1*s.* 6*d.* sterling per cwt., or fifteen per cent.; Madeira, in casks, 1*s.* sterling per gallon, and £7 sterling per tun of 250 gallons. All other wines, except French, in wood, 6*d.* sterling per gallon, and £7 sterling per ton; wines, French, in wood, 6*d.* sterling per gallon, or 7½ per cent.; wines, in bottle, £7 7*s.* sterling per ton, and 7½ per cent. and 1*s.* sterling per dozen bottles; brandy, *Geneva*, cordials, or other spirits, except rum, not sweetened, and not exceeding the strength of proof by "Sykes's hydrometer," 1*s.* 9*d.* sterling per gallon, and so in proportion for any greater strength than the strength of proof; rum, sweetened, 2*s.* 7*d.* sterling per gallon; rum, not sweetened, and not ex-

ceeding the strength of proof by "Sykes's hydrometer," 1*s.* 6*d.* sterling per gallon, and so in proportion for any greater strength than the strength of proof.

Bonds are allowed on all provincial duties when amounting to £50 and upwards, with conditions for payment at 6 months from the date of such bond, if the same shall be dated on or before the 1st day of September; and if dated after the 1st day of September, then it becomes due on the 1st day of April next ensuing.

Any information relating to the trade between the province and the United States, through this port, will be cheerfully supplied by addressing the undersigned.

JASON C. PIERCE & SON,
Forwarders and Commission Merchants,
Steamboat and Custom-House Agents,
Saint John's, L. C.

No. 17.

CUSTOMS, ST. JOHNS, L. C.
December 28, 1842.

SIR: I have to acknowledge the receipt of your letter of 23d inst., requesting I would reply to questions therein contained relative to what changes have taken place in our provincial duties on goods imported from the United States, on wheat, flour, beef, pork, lard, &c. In reply thereto, and to enable you to have a more correct knowledge of what the duties will be after the 5th of July next than I could give you in a letter, I now beg leave to enclose you a number of Neilson's Quebec Gazette, containing a summary of the trade act of the British possessions abroad, which goes into operation after that date. In the margin I have put down the additional duty imposed by our provincial statutes on many of the articles, viz:—

On butter and cheese there is an additional duty of 5 per cent.

Coffee, 2 pence per pound, if green; roasted or burnt, 5 per cent.

Coffee, 4 pence per pound, if ground.

Cocoa, 5 per cent.

Molasses, 1s. 6d. per cwt.

Sugar, unrefined, 1 penny per pound; refined 2 pence per pound.

Teas, 3 pence per pound.

Rum, 6 pence per gallon, hydrometer proof.

Other spirits and cordials, 1s. 7d. per gallon.

Salt, for every barrel of 280 pounds, 2. 6d.

On leaf tobacco, 1 penny per pound.

Manufactured tobacco, 2 pence per pound.

Madeira wine, 1s. per gallon.

Other wines, 6 pence per gallon.

All other articles charged with an ad valorem duty of 15 per cent., 7 per cent. and 4 per cent., an additional duty of 5 per cent.

In the table of exemptions, all the articles marked ⋈ are subject to a duty of 5 per cent. by provincial acts. The others not marked ⋈ are entirely free. In the last session of our Provincial Parliament, an act was passed imposing a duty of 3 shillings per quarter on wheat, which act has been reserved for Her Majesty's sanction; if sanctioned, it goes into operation on the 5th July next. I cannot state positively whether American produce, after payment of duty on importation in Canada, will be admitted into England as Canada produce. But, from the decision of the Commissioners of the Customs, lately given, that hams so admitted could be imported into Great Britain as Canada hams, I should conceive it would apply to all American produce. I am of the opinion the question will be finally settled in the next session of the Imperial Parliament.

At present, *teas, oil, blubber and skins*, the produce of fish and creatures living in the sea, of foreign fishing, are prohibited, but will be admitted after the 5th July next.

The duties are all paid in sterling money, at the rate of 4s. 4d. to the dollar—equal to 5s. 1d. Canada currency, or nearly 102 cents. The imperial duties are levied on the amount of invoice cost in the United States, and adding thereto 10 per cent. For instance: should the amount of invoice be £100, the duty is charged on £110. The provincial duties are charged on the amount of the invoice, without the additional 10 per cent.

It is supposed there will be some material changes, at the next meeting of our Provincial Legislature, in the tariff of duties imposed by them. There will, no doubt, be a reduction of the duty on tea, and an additional duty on some other articles; however, they cannot reduce the duties imposed by the Imperial Parliament, though they have the power of adding to them.

The foregoing information and explanations will only apply to the trade of the two countries, after the 5th of July next. Messrs. Jason C. Pierce & Son, or Mr. Isaac Coote, forwarding merchants of this place, who have prepared a tariff of duties (for the information of their correspondents) now in force, would, no doubt, forward them to you, on application to them; or might obtain them from some of their friends in Burlington.

Any information I could give you I would cheerfully do, and have the honor to be your very obedient servant,

W. MACRAE, Collector.

WILLIAM P. BRIGGS, Esq.

No. 18.

Correspondence of the Journal of Commerce.

LIVERPOOL, September, 1842.

Our new tariff being so favorable to the introduction of American provisions into England that we have the prospect of an extensive and steady import of various articles of produce from thence, we would throw out, for the guidance of those who contemplate engaging in the preparation of provisions for our market, some suggestions which we conceive to be important, and a compliance with which, will operate favorably to the interests of those engaged in the trade. We are aware that the shipment of beef and pork to England this year, has turned out a very unprofitable operation, and, in consequence, many persons feel discouraged from prosecuting the trade, having got the impression that a prejudice exists in the country trade against American provisions.

Such is not the case, however. It is true that those articles have been almost unsaleable in our market, but the reason is found in the fact of their entire want of adaptation to our tastes, and their general inferiority to what we have been in the habit of receiving from Ireland and Hamburg. Of this inferiority there is sufficient evidence in

the fact, that while Irish pork has been selling freely at 70s. a 75s., the American has been with difficulty disposed of at a price equal to 48s., duty paid.

This inferiority, as regards pork, arises principally from the hogs being generally fed on beech nuts, or other wild feeding, which makes the meat soft and oily; but it is partly owing, also, to the hurried way in which provisions have been cured and packed, (especially in the western country,) and to the use of an inferior salt, quite unsuitable to the purpose. We would urge strongly on shippers the propriety of bestowing more care on the selection and preparation of pork for our market in future, as a soft and inferior article is almost unsaleable with us, and the shipment of such will be certainly productive of loss to the owner. These remarks apply with equal force to beef, which has been inferior, not only in consequence of insufficient fattening, but also from being very roughly handled. The form, too, in which both articles have been cut, has tended to occasion this depreciation in our market; and although it may not appear of sufficient consequence to affect their value, yet, taking into consideration that our buyers have been accustomed to a certain cut for many years, it is reasonable that their tastes should be consulted. Of one thing we feel assured, that shippers will find it to their advantage to fall in with the requirements of our market.

We think it unnecessary to give in detail the process of curing followed in Ireland, as the difference in climate may require some peculiarity in the mode to be adopted in America, but we furnish particulars which we consider most important. Bacon is made from pigs of any size, from 160 pounds up to the heaviest weights, and in the form either of long or short middles.

In making the former, the head and hams are cut off, the remaining bone is removed, taking as little of the lean meat off with the ribs as possible. The shoulder blade being taken out, the loose parts are cut off, so that no porket is left to disfigure the bacon; the edges are squared and trimmed, all the soft and flabby fat being removed. Short middles are also free from bone, and differ from them only in having the shoulders taken off. This cut, being most esteemed with us, always commands 2s. per cwt. advance on the price of long middles. Bacon is always cured in dry salt, and, when shipped to the English market, is packed with fresh salt, in Russia mats or coarse linen cloth, in bales weighing from three to four cwt. each. Boxes made to fit the size of the middles would suit equally well, if that mode of packing is found cheaper.

Hams are cut round and well trimmed, all the soft fat being taken off. They are cured in dry salt also, and, after being washed and well dried, (without being smoked,) are packed in hogsheads with the husks of oats, bran, cut straw, or any other dry material of like character, which will absorb the moisture produced by sweating. The shanks are cut off above the knee-joint with a saw, and not with a cleaver, as practiced now in America.

Mess pork is made from hogs weighing from 160 to 220 lbs., and is cut in pieces as nearly as possible of 4 lbs. each. The whole hog is used, with the exception of the head, feet, and legs to the knee-joint. When packed for exportation, it is put in barrels containing fifty pieces, weighing 200 lbs. with St. Ubes' or Turk's island salt, and in new pickle.

Mess beef is made from fat cattle only, and is cut in pieces of 8 lbs. each, the whole carcass, with the exception of the head, feet, and legs, being used. It is packed with St. Ubes' or Turk's island salt, in a new pickle, in casks containing 38 pieces, weighing 300 lbs. The mode of curing both beef and pork is to pack the pieces in dry salt, in large casks or vats, which are then filled up with pickle, having just so much saltpetre in it as will give the meat a color. At the end of 24 hours, or so soon as the salt and saltpetre have taken effect, and the blood remaining in the meat has been purged out, it is put in a new pickle, in which it remains until packed for exportation. The quality of the meat is injured by the use of saltpetre in any pickle after the first. The casks must be perfectly water-tight, and have two iron hoops on each end.

All pickle is made of such strength that an egg will float in it, and, after being allowed to settle, the scum is taken off the surface. Beef and pork have the name of the packer or shipper branded on the head of the cask, and below the name "38 pieces prime mess beef," or "50 pieces prime mess pork." Other qualities are put up in Ireland; but we consider the above to be the most deserving of the attention of American shippers.

It is not required that beef and pork should undergo a public inspection, as we consider that the best security of their marketable character is found in the obvious interest of packers to furnish such an article as will earn a good name for their brand, and obtain the highest current rates.

Fine leaf lard, if unmixed and well managed, will, we think, be a profitable article for shipment. It is put up in neat white kegs, containing about 40 lbs. each. The lard is poured into the kegs at the head, and, so soon as it has cooled and settled down, the surface is made level, and covered with white paper, which prevents it from adhering to the lid when opened for inspection in our market. It is also put up, to a considerable extent, in bladders, and shipped in hogsheads packed with bran or cut straw. It is important that the bladders should be well cleaned by scraping and the use of acids, so that they may be tolerably transparent. The inferior lard may be put up in packages of any size, which, when large, should be iron-hooped.

We call the attention of curers in the United States to the fact, that while bacon and hams when dried pay a duty of 14s. per cent, if shipped in pickle they will be passed by our customs at the pork duty of 8s. As a set-off, however, against the 6s. per cwt. saved in duty, it must be recollected that pork cured in pickle is inferior in quality to that cured in dry salt, and will not bring an equal price; that it is shipped in that form at an increased cost of packages and freight; and that it pays a duty on a greater weight than when dried. We give these considerations, that shippers may decide for themselves which is the preferable mode of shipment.

By the subjoined extract from the tariff, it wil

be seen that the different duties in favor of colonial produce are so great as to give a decided advantage to Canada in the shipment of all provisions for our home consumption. Thus, in beef and pork, while foreign is subject to a duty of 8s. per cwt. colonial is admitted at 2s.; but it is understood that, by the repeal of the 42d clause of the 3d and 4th William, cap. iv, 57, both foreign and colonial will not be admitted. for ship stores, free of duty. This feature in the bill we consider most important to America, and would call the attention of curers there to the altered position of trade in that particular. Lard is also admitted on favorable terms; and, as our demand for that article for machinery and manufacturing purposes is very large, we would strongly recommend that the soft pork sooould be melted down and shipped in that form. The high duty on foreign butter being retained, will prevent any regular trade in that article for America, except when prices are so low as to make it an object of attention for shipment as grease. Under this name it is liable to a duty of 1s. and 8d. per cwt. only. In Canada, the soil appears to be very favorable for the production of this article; and, under the present modified duty, it will become, we think, one of very large export. The principal fault in Canadian butter at present is, that the milk is not sufficiently pressed out, and, consequently, when shipped on a long voyage, it becomes rancid before it can be consumed. It should be packed in casks containing from 70 to 80 pounds, which must be air-tight.

Cheese has already been shipped extensively; and, as the quantity produced is increasing every year, it is likely to become an item of considerable trade. This article has been shipped, heretofore, without much judgement being exercised in the selection or assortment of the qualities, which has prevented the returns being so satisfactory as they otherwise would have been. American cheese is, for the most part, insufficiently pressed, which gives it, when cut, a porous or honeycomb appearance. It is also unpleasant in flavor, owing to the too free use of rennet. The removal of these faults would very much enhance its value in the English market.

With respect to grain and flour, it will be understood that the new corn bill has placed the trade on a much more safe and steady footing; though there will always be uncertainty while the principle of the sliding scale of duties is preserved.

On this branch of the trade no observations are required.

Besides those articles of produce mentioned, there are, no doubt, others deserving the attention of shippers; but we consider those specified as having the most immediate importance.

The general directions now given being the result of our experience while engaged for some years exclusively in the produce trade, and being suggested by our personal inspection of provisions and of the modes of curing we adopted in America, will be found, we conceive, not unimportant to those entering on the business.

We have expressed our belief that, under the existing tariff, a large trade in produce will arise; but when we look at the rapid progress of Free Trade principles in Britain, and the urgency of the popular demand for cheap provisions, we may safely predict a much more extended trade within a few years, in consequence of the still farther modification of our Provision Laws.

JOHN & CHARLES KIRKPATRICK,
Produce Commission Merchants.

PRESENT DUTIES.

	Foreign.	*Colonial.*
Bacon, per cwt.	£0 14 0	£0 3 6
Beef, fresh and salted, per cwt.	0 8 0	0 2 0
Butter, per cwt.	1 0 0	0 5 0
Butter, as grease, per cwt.	0 1 8	0 0 3
Cheese, per cwt.	0 10 6	0 2 6
Hams, per cwt.	0 14 0	0 3 5
Lard, per cwt.	0 2 0	0 0 6
Pork, per cwt.	0 8 0	0 2 0
Tongues, per cwt.	0 10 0	0 2 6

Five per cent. extra is payable on the amount of the above duties.

No. 19.

WASHINGTON, February 6, 1843.

SIR: Agreeably to your request, I give a very brief description of the process used by the citizens of Vermont in the manufacture of sugar from the sap of the maple-tree. The process in the early settlement of the State was very simple, being nothing more than evaporating the sap in iron kettles, usually about the capacity of ten gallons each, suspended over a fire made of logs, in the open air. When the sap is evaporated in the ratio of about ten or twelve gallons into one, the product is taken from the kettles, strained through a flannel bag, which takes from the sirup the leaves, coals, &c, which get into the kettles while over the fire. The sirup is then put into deep vessels, where it remains for two or three days, to settle. The sirup is then carefully taken from the vessels, leaving the sediments, and returned to the kettles, with the addition of about a pint of skimmed milk to a kettle containing eight or nine gallons of sirup. It is then slowly heated, when most of the impurities remaining in, the sirup will rise to the surface, and may be taken off with a skimmer. The sirup is then evaporated to the proper consisteney, which is ascertained by cooling small quantities in a spoon, or in some small vessel. The product is then taken from the fire, and either stirred until it is cool, by which it becomes dry sugar, or, more commonly, it is put into a tub or trough, and left to cool, without stirring. This is afterward drained by drawing a plug from the bottom of the tub or trough, thus separating the molasses from the sugar.

In the early settlement of the State, and even at the present time, in new settlements, the above has been the usual mode of making sugar.

In the older settlements, buildings are erected within or near the sugar-orchards. In these buildings, large kettles are set in brick furnaces, for the purpose of evaporating the sap. In some of them, shallow pans, made of sheet-iron, about six inches in depth, and of various dimensions, are also used. These pans are also set in brick furnaces, and are believed to evaporate much faster than deep kettles of the same capacity.

The common method of extracting the sap from the maple is, by boring into the tree, about two inches, with a three-quarter inch bit or auger. The sap is then conveyed into small tubs, hold-

ing three or four gallons each, called sap-buckets, by spiles slightly inserted into the tree. It takes about four gallons of sap to make one pound of sugar. The season for making sugar in Vermont commences between the middle of March and the first of April, as the spring is more or less forward, and lasts about three weeks. One hundred good trees will yield sap sufficient to make from ree to five hundred weight of sugar.

Very respectfully, your obedient servant,
SAMUEL C. CRAFTS.

HENRY L. ELLSWORTH, Esq.
Commissioner of Patents.

E.

Statement of receipts for patents, caveats, disclaimers, improvements, and certified copies, in the year 1842.

Amount received for patents, caveats, &c	$35,790 96	
Amount received for office fees	714 67	
		$36,505 63
Deduct, repaid on withdrawals		8,086 95
		28,418 68

F.

Statement of expenditures and payments made from the patent fund, by H. L. Ellsworth, Commissioner, from the 1*st of January to the* 31*st of December*, 1842, *inclusive, under the act of March* 3, 1839.

For salaries	$16,350 00	
For contingent expenses*	3,687 61	
For library	105 37	
For temporary clerks	2,830 75	
For agricultural statistics, &c	105 75	
For compensation to the Chief Justice of the District of Columbia	75 00	
		23,154 48
Leaving a net balance to the credit of the patent fund		5,264 20

*Expenses incurred recovering jewels not included.

G.

Statement of expenditures on the restoration of the Patent Office, under the act of 3*d of March*, 1837.

For draughtsmen	$2,400 00
For examiner and register	1,000 00
For restoring records of patents	174 06
For restoring drawings	103 00
For restoring models, and cases for models	9,763 54
For freight on models	462 88
For stationery	156 52
	14,060 02

H. L. ELLSWORTH.

PATENT OFFICE, *January*, 1843.

TABLE OF CONTENTS.

ON

RAISING SWINE,

AND

THE BEST METHODS OF FATTENING PORK.

FROM THE FOURTH REPORT OF THE AGRICULTURE OF MASSACHUSETTS.

BY HENRY COLMAN,
Commissioner for the Agricultural Survey of Massachusetts.

Swine form a considerable portion of of the live stock of Middlesex county. Though Middlesex is not a hog-raising county, yet such is the number of swinish emigrants into it, and the respectability of the condition to which they are advanced after their arrival, that I might be liable to the charge of some Jewish prejudice if I passed them over in silence. Some years since, at a Brighton Cattle Show, an accomplished scholar, then a professor of Harvard University, and afterwards Governor of Massachusetts, whose wit was always racy, and when let out, sparkled and bubbled like a soda fountain, in toasting the farmers of Massachusetts and the literati of her college, expressed a wish that their *pens* might equally do them honor. Without disparagement to the other side of the house, this wish I may say, in respect to the farmers of Middlesex, seems accomplished.

Large numbers of swine, are brought into this county for sale. These come mainly from the state of New-York. Until within a few years, a breed, known as the Grass-fed hogs, constituted the principal stock. This was a hog, raised with little other feed than clover pasturage for the first six months, of a white color with black patches sprinkled over him, long and well formed of good thrift, and who, with good keeping, at eighteen months old, was easily brought to 400 and 500 pounds weight. Within the last few years the Berkshire hog has been introduced. His symmetry, thrift, cleanliness, fineness of bone, his excellent shoulders and hams, and, above all, his good humor and his marked deficiency in the organ of tune, secured universal favor. In my visits among the farmers since the introduction of this race, I have been amused with their enthusiasm for their swine, resembling that of parson Trulliber, in Fielding's History of Joseph Andrews; and in finding them, I had almost said, more proud of their Berkshire pigs at their troughs, than of their chubby and rosy-cheeked children round their supper-tables. I am a great admirer of the Berkshire swine, but I could never sympathize in these preferences; and my respect for human nature has considerably increased since the progress of the blessed Temperance reformation, and since men are now seldom seen as formerly with all rationality extinguished, and even their animal nature outraged and degraded.

We have been compelled, however, in this as in many other cases, to witness the capriciousness of public favor; and to adopt, with the variation of only a letter, the familiar proverb, and say in this case, that "every *hog* must have his day." The popularity of the Berkshire swine is on the wane. It is objected to them by many farmers that they are not large enough, though they are easily made to reach, at fourteen months old, 300 or 350 lbs.; and further, that they do not cut up well; and that the fat on their backs and sides is not thick enough, especially for packing down for fishermen, who would be glad to have their pork all fat, and whom I have seen spread their uncooked salted fat pork, as landsmen spread butter, on their bread.

The former objection is not made by all persons, as many would prefer for their tables the pork of a hog weighing 300 lbs. to that of hogs weighing 600 lbs., of which I have seen many in our market. With respect to the latter objection, I was half disposed at first to consider it a mere caprice, but that E. Phinney, of Lexington, a farmer in this matter "not unknown to fame,"—and another most respectable farmer of Franklin county, admit that there is some truth in it; and they, as well as many others, prefer a cross to the pure blood. The impression is becoming general, and the butchers in Quincy market are unanimous in their unfavorable opinion of the Berkshire hogs. They admit that their hams and shoulders are good for bacon; but their backs, where they most require it, have no depth of fatness, and they are therefore unsuitable for salting. They are good breeders and nurses. They may be kept, therefore, to much advantage where the object is to raise roasting pigs for the market. This is sometimes quite profitable where a sow has two litters a year. A roast pig, only weaned by the knife, has from time immemorial been deemed a most luxurious dish. So it is likely to continue to be. Charles Lamb says that the Chinese never knew the lusciousness of a roasted pig until an accidental fire occurred which destroyed a pig-stye with its inhabitants. In pulling the bodies of these poor creatures burnt to a crisp from the fire, some of the skin or flesh adhered to the fingers of the Chinese, and in putting their hands by chance to their mouths, they for the first time in their lives inhaled the odor and

tasted the deliciousness of the roasted skin. After that, the *accidental* burning of pig-styes became so common that the civil authorities were compelled to interpose.

It is but just, however, to the Berkshires to say, that the unfavorable impression in regard to them, though general, is not universal. An intelligent and very exact farmer at Braintree, B. V. French, has found them to answer his expectations. Upon recently killing a number, he was well satisfied with their appearance, and is of opinion that much of the prejudice which exists against them belongs properly to the impure but not to the genuine race.

The introduction of the Chinese hogs into this country and into England seems to have been the foundation of all the extraordinary improvements which have taken place in this race of animals—improvements which, within less than half a century, have doubtless enriched the State of Massachusetts many hundreds of thousands of dollars, and the country by millions. The effects of this cross with other swine have been to give fineness of bone, plumpness and fulness of form, extraordinary thriftness, and quietness of demeanor. The old race of hogs, seemed to be of the wolf species in temper as well as condition, and were the personification of ugliness and rapacity. The first introduction of one of these animals into a secluded part of Scotland, within the last century, is matter of comparatively modern history. Having got loose from his stye, he appeared to the terrified imaginations of these simple people as the archfiend himself, and crowds hovered together through fear—the parish schoolmaster being at their head with an open bible, to endeavor to lay this evil spirit! The animal now, in his improved condition, is regarded as one of the farmer's best friends; he eats what nothing else will eat; he is a general scavenger, and an excellent composter of manure. His own manure is one of the most enriching substances which can be supplied to the soil, though not one of the most lasting in its effects; and his flesh is the most frequent dish upon the farmer's table. This county may boast of great improvements in their swine.

A Mr. Mackay, of Boston, owning a farm in Weston, obtained from abroad, some years since, a valuable hog, whose natural good qualities by good management he greatly improved. Some of this breed of swine have been most remarkable for thrift and weight. Besides this, a hog called the Mocho hog, long, round and thrifty, whose pedigree is not known, has been introduced here. Some of the best hogs which I have seen have been from an admixture of these three bloods. Mr. Phinney emphatically approves this cross; and the weight of his swine when killed, of some of which I subjoin an account, establishes the soundness of his judgement.

In 1840, Mr. Phinney sent the following hogs to market:

Feb. 6.		Feb. 15.	
1 weighed	407 lbs.	1 weighed	469 lbs.
2 "	414 "	2 "	367 "
3 "	413 "	3 "	362 "
4 "	305 "	4 "	331 "
5 "	364 "		
6 "	366 "		

Feb. 17.		Mos. old.
1 weighed	763 lbs.	20
2 "	591 "	15
3 "	476 "	15
4 "	430 "	12
5 "	475 "	12
6 "	465 "	12
7 "	430 "	12
8 "	464 "	12

In 1841, the subjoined is a list of fifteen Berkshire and Mackay hogs from the same farm.

February 22, 1841.

1	weighed	738	lbs.	1	weighed	528	lbs.
2	"	655	"	2	"	523	"
3	"	579	"	3	"	517	"
4	"	574	"	4	"	503	"
5	"	556	"	5	"	501	"

1	weighed	487 lbs.
2	"	480 "
3	"	476 "
4	"	441 "
5	"	400 "

The grass-fed hogs, which I have before mentioned, are regaining their popularity. They have been, to a degree, crossed and intermixed with various valuable breeds in the interior, and are now preferred to all others in the Brighton market. With good care and keeping, at fifteen and eighteen months old they are easily carried to 500 and 600 lbs.

Of four, fatted by Stephen Morse, of Marlborough, the current season, the weight was as follows: 539 lbs., 530, 506, 459—averaging 508½ lbs. each. These hogs were put into the stye in September, 1840, weighing between 70 and 80 lbs. each, and were killed in October, 1841. They were kept mainly upon boiled potatoes the first winter, and since that, upon the slops of the dairy, skim milk, butter milk, whey and Indian meal.

Some of the best hogs which I have ever seen have been fatted at the slaughtering establishment of Jesse Bird, in Watertown. He keeps his swine about six months. He purchases the grass breed above mentioned, preferring hogs with a small head, round and full body though not deep belly, and with full shoulders and broad backs. They are taken in, weighing from 170 to 200 lbs., kept in the slaughter-yard for a time, and, previous to killing, are fed upon potatoes and Indian meal cooked, and are brought to weigh from 450 to 600 lbs.

At the slaughtering establishments in the vicinity of the capital, large amounts of pork are supported and fatted upon the offal. Sometimes this is cooked for the swine; in other cases, it is given in its raw state, so that without any troublesome change in the way of preparation, the hogs eat the cattle and then men eat the hogs. It is easy, but not agreeable to imagine in such cases what the pork may be. The richness of animal food becomes thus a little too much concentrated even for the epicurian palate; and few persons knowingly would have the courage to touch such food when coming directly from the slaughter-yard, excepting some, who are cannibals by nature, and by some accident have been misplaced in a civilized country. It answers very well for shipping pork, for no questions of taste are ever held over a barrel of provision either on a slave plantation or at sea. It is ascertained, however, that in fatting

swine, some portion of animal food and pot liquor is highly conducive to thrift. In the best establishments, the hogs some time before being slaughtered, are put upon vegetable food, potatoes, Indian meal, &c, so that the rankness of the pork is taken away.

E. Phinney's swine established at Lexington, is among the most extensive in the county. His number of fattening swine averages about 100, with fifty store hogs, and they are killed in February and March, when from 10 to 18 months old, being of the fall and winter litters of the previous year. His pens are well arranged; seldom occupied by more than three or four in a pen. They have a manure-yard attached to each pen, into which bog-mud and litter are thrown for their manufacture and compounding, and they have always a dry and comfortable bed. They are fed regularly three times a day. I shall subjoin an account given by himself of his mode of management, which the farmers will read with interest; and shall annex at the end, a sketch of his styes or barracks.

"An inquiry is often made as to the best time of killing, or at what age it is most profitable to slaughter them. On a large farm where much green herbage is produced, and where the value of the manure is taken into the account, the pigs killed at the age of 15 or 16 months, give the greatest profit. When it is intended to kill them at this age, they may be kept on more ordinary and cheaper food for the first 10 or 12 months, or till within four or five months of the time of killing. The manure they make and the extra weight of pork more than pay the expense incurred in keeping them the longer time; but the spring pigs, which are to be killed the ensuing winter and spring, must be kept upon the best of food from the time they are taken from the sow until they are slaughtered.

"The older class of pigs, for the first ten or 12 months, are kept principally upon brewers' grains, with a small quantity of Indian or barley meal, or rice, ruta-baga, sugar-beet, &c, and in the season of clover, peas, oats, cornstalks, weeds, &c, they are cut green and thrown into the pens; the next four or five months before killing they have as much Indian meal, barley meal or rice, with an equal quantity of potatoes, apples or pumpkins, as they will eat, the whole being well cooked and salted, and given to them about blood warm. During the season of fattening, an ear or two of hard corn is every day given to each pig. This small quantity they will digest well, and of course there is no waste. Shelled corn, soaked in water made as salt as the water of the ocean for 48 hours, with a quart of wood ashes added to each bushel and given to them occasionally in small quantities, greatly promotes their health and growth. Their health and appetite is also greatly promoted by throwing a handful of charcoal once or twice a week into each of their pens. Their principal food should, however, be cooked thoroughly and nicely. From long practice and repeated experiments, I am convinced that two dollars' worth of material well cooked, will make as much pork as three dollars' worth of the same material given in a raw state.

"Pigs when first taken from the sow should be treated with great care, to prevent them from scouring and becoming stinted; when either of these happen, it will require many days and sometimes weeks to put them again into a healthy, growing condition. When first deprived of the maternal food, a little new or skim milk, boiled and slightly salted and given to them often and in small quantities, will prevent scouring and greatly promote their growth. If intended for killing at the age of 9 or 10 months, they should be full fed all the time and kept as fat as possible. If, on the other hand, they are intended for killing at the age of 15 or 18 months, they should not be full-fed, nor be made very fat for the first 10 or 12 months.

"To satisfy myself of the benefit of this course, I took six of my best pigs, eight weeks old, all of the same litter, and shut them in two pens, three in each. Three of these I fed very high and kept them as fat all the time as they could be made.—The other three were fed sparingly, upon coarse food, but kept in a healthy, growing condition, till within four or five months of the time of killing, when they were fed as high as the others.—They were all slaughtered at the same time, being then 16 months old. At the age of 9 months the full-fed pigs were much the heaviest, but at the time of killing, the pigs fed sparingly for the first 10 or 12 months weighed, upon an average, fifty pounds each more than the others. Besides this additional weight of pork, the three "lean kine" added much more than the others to my manure heap. These results would seem very obvious to any one who has noticed the habits of the animal. In consequence of short feeding, they were much more active and industrious in the manufacture of compost, and this activity at the same time caused the muscles to enlarge and the frame to spread, while the very fat pigs became inactive, and like indolent bipeds, they neither worked for their own benefit nor for that of others.

"For the purpose of increasing my manure heap, my pens are kept constantly supplied with peat or swamp mud, about three hundred loads of which are annually thrown into my styes.—This, with the manure from my horse stable, which is daily thrown in, and the weeds and coarse herbage which are gathered from the farm, gave me about 500 cart loads of manure in a year.

"On regular and systematic feeding and clean and dry bedding, the success of raising and fattening swine very much depends. A faithful feeder, also, who has some skill and taste, and withal a little pride of vocation, is indispensable."

Of all articles ever given to fatting swine, Indian meal is, without doubt, the most nutritious.

Mr. Phinney, it seems, has by actual trial, settled a much vexed question, whether hogs should be forced by full feeding when young, or at first be only kept well in a growing state. He found it better, when designed to be kept more than a year, to let the young animal, by sufficient but not excessive feeding, have time to develop himself and acquire a natural size, rather than, by filling him to repletion, to bring on a premature state of fatness, which seemed to check the growth. To young pigs, milk, whey and butter-milk are the best of all feed; but where cows are kept for the purpose of supplying the market with milk,

the pigs will be of course regarded as very poor customers. "The milkman will not call."

The establishment of J. P. Cushing, Watertown, for keeping and fatting swine, is upon a large scale, and is exceedingly well contrived for his situation. It consists of a long one-story building, with separate pens on one side extending the whole length, each designed for four swine, with an opan yard and a lodging and eating room to each, besides some lying-in apartments.* A commodious passage-way runs the whole length of it, with the troughs projecting into the passage-way, and a shutter for the troughs so contrived that the trough is easily cleaned at any time, and the food of the hogs is placed before them without admitting that which, in the usual slovenly mode of feeding, is but too common, an uncivil interference on their part before all is ready. Some contrivance as effectual as this for another class of animals would be quite useful at some of our public hotels and steamboats, and save us from the severe remarks of those foreign travelers who have little sympathy with our customary despatch of business, and seem to look upon us as a nation of fire-eaters.

The cooking apparatus is at one end. Had economy of room and ease of feeding been studied, the building might have been double the width, with pens on each side. In England, they are sometimes made circular with the cooking apparatus in the centre and the feeding troughs all within the circle; but in such cases there must be much waste of room. Mr. Cushing's barracks are lengthwise of his cattle-yard, so that the manure from the pens of his swine is thrown immediately into the yard, and any litter or muck easily supplied in the same way. His store hogs, too, at pleasure may be turned into the cattle-yard with the advice given in Æsop's fable by the dying father to his sons, "that there is a treasure buried in the field which they would find by digging for it." The swine however do not much need the advice. They are natural philosophers, and go by instinct into deep investigations. Some of them should always be kept in barn-yards and cellars. They are of great use in turning up and mixing the manure; and in yards where cattle are fed upon grain, and the sweepings of the barn floors are thrown out, they take care that nothing is lost. I have known a considerable number of store hogs kept in a thrifty condition upon that only which they obtained in a yard where a proportional number of beef cattle were stall-fed. The philosophy of reciprocal uses, which is apparent in every department of nature, though it frequently presents itself in a form offensive to a fastidious taste, is to a reflecting mind always instructive on the wonderful economy of the divine providence.

The question of profit in keeping and fattening swine has been much discussed, and so much depends on circumstances of age, breed, food, length of time kept, and price in the market, that the question must remain open. Mr. Phinney gives it as his opinion that with Indian corn at one dollar per bushel and potatoes at 33 cents, and price of pork 12 cents, they may be fatted to a profit. In his experience, he says, four quarts of Indian or barley meal with an equal quantity of apples, pumpkins, potatoes or roots cooked, will give two pounds of pork.

A small example of fatting swine in Medway, Norfolk county, which came under my notice, seems worth recording, because an exact account of their cost was kept. The owner was a mechanic and bought every article of their feed, not even keeping a cow. His two hogs when killed weighed, one 420 lbs.—one 382 lbs., and pork was then worth 12 cents per lb. Value when dressed, $96 24. They were killed at 14 months old. They were bought in November and killed in the December of the next year. They were kept in the stye the whole time; were fed three times a day with weeds, corn, and potatoes. The potatoes were boiled and the Indian meal mixed with them into a mash. They were fed exclusively on corn one week before being killed. They did as well in winter as in summer. Salt was frequently given to them in their swill. The price of corn bought for them was 117 cts. to 136 cents, or an average of 130 cents per bushel. Potatoes were 30 cents per bushel. The whole cost of the hogs when fatted was $62, including the price of purchase, or 7.8 cents per lb.

I shall here subjoin some careful experiments made by myself a few years since in relation to this subject. They were given to some portion of the public at the time, in another form; but they may here reach many by whom they have not been seen, and to whom they may be interesting.

Experiment 1. Two hogs about one year old; one of them a barrow in very good condition; the other a barrow recently gelded and in ordinary condition, were put up to be fed exclusively upon Indian hasty pudding or Indian meal boiled with water. We began feeding them the 1st of March, 1831, and weighed them again on the 19th of the same month. In the eighteen days they consumed six bushels of Indian meal. They were offered cold water to drink but did not incline to take any.

The result—

No. 1 weighed on 1st March,.....	233 lbs.
" " 19th "	269
Gain.....	36
No. 2 (recently gelded,) weighed on 1st March.....	190
" " 19th March	247
Gain.....	57

The gain of the two was 93 lbs. in 18 days.—The quantity of meal consumed by them was 10 quarts per day to the two. We allow 30 quarts to a bushel, deducting two for grinding. The price of corn at the time was 70 cents per bushel. The expense of the increase weight is 4.5 cents per lb.

March 21, 1831. Killed the hog mentioned first in the foregoing experiment. Live weight 273 lbs. Weight when dressed 215 lbs. Loss in offal, loose fat included, 58 lbs. or a little more than one fifth.

* The length of this building, including the cooking place, is 252 feet, width 12 feet, and hight the same. There are twenty pens, each 12 feet by 8, and a yard of 12 feet attached to each pen. The number of hogs that can be accommodated depends upon their sizes—from three to six, say an average of four of 300 weight each. There were fatted fifty-two hogs last season, weighing, dressed, 15,573 lbs.

Experiment 2.—No. 2, mentioned above weighed
On 23d March..... 253 lbs.
On 30th April..... 312

In 38 days, gain..... 59 lbs.
No. 3, a shoat purchased from a drove, weighed on 28th March..... 100 lbs.
Do. on 30th April..... 151

Gain in 33 days..... 51 lbs.

This is a fraction over 1 lb. 8 oz. per day each, nearly 1 lb. 9 oz.

In this case their food was exclusively boiled potatoes mashed with Indian meal. The exact amount consumed not ascertained, but fed as freely as they would bear.

Experiment 3. The two last-named hogs were for the next 20 days put upon Indian hasty pudding exclusively, with the following result:

No. 2 weighed on 30th April..... 312 lbs.
" " 20th May..... 382

Gain in 20 days..... 70 lbs.
No. 3. weighed on 30th April..... 151
" " 20th May..... 185

Gain in 20 days..... 34 lbs.

The two in the above named 20 days, consumed four and one-half bushels of meal, cooked as above. Meal 78 cents per bushel. Gain of the two, 104 lbs. in 20 days.

Experiment 4. Sundry swine purchased from a drove, and fed with meal and potatoes, washed and mashed—

	28th March, 1831,	19th May, 1831,	
No. 1,	weigh 97 lb.	165 lb.,	gain 52 days, 68 lb.
2,	" 134	182	" " 48
3,	" 100	186	" " 86

The two following, raised on the farm, and fed as above—

	25th April, 1831,	19th May, 1831,	
No. 4,	weighed 151 lb.	206 lb.,	gain 24 days, 55 lb.
5,	" 140	165	" " 25

Experiment 5. In this case it was not intended to force their thrift, but to keep the swine in an improving condition. They were shoats of the last autumn, and were of a good breed.

Tuesday, 3d April, 1833. Put up four shoats, and began feeding them with Indian hasty pudding.

	3d April,	22d April,		25th June,	
No. 1,	176 lb.	202 lb.	gain 25	264 lb.	gain 62
2,	119	153	" 34	226	" 73
3,	150	170	" 20	218	" 48
				[Total, 183 pounds.	
4,	121	145	" 24	killed 30th May.	

From 3d April, to 22d April the above swine consumed seven bushels and one peck of Indian meal. From 22d April, to 25th June, seven bushels of Indian meal, cooked as above.

One of the above, No. 4, was killed on 30th May; being absent, the live weight was not ascertained.

On the 25th June, the three remaining hogs were weighed, and in the 63 days from 22d April to 25th June, they had gained in that time 183 lbs. as above.

After 30th May, when one of them was killed, one peck of meal made into hasty pudding with a small allowance of the waste of the kitchen for a part of that time, lasted them three days, that is 22-25 or less than a quart, say ⅞ of a quart per day to each.

At first we employed half a bushel of Indian meal to make a kettle of hasty pudding; but we soon found that a peck of meal by being boiled sufficiently would make the same kettle nearly full of hasty pudding and of sufficient consistency. The kettle was a common-sized five-pail kettle, set in brick work in the house; and it was remarkable that the peck of meal produced nearly the same quantity of pudding, that we obtained from the half bushel, which showed the importance of inducing the meal to take up all the water it could be made to absorb.

The price of Indian corn was at that time 75 cents per bushel—30 quarts of meal to a bushel deducting the toll. The amount of meal consumed in the whole time from 3d April to 25th June was 14¼ bushels—the cost $10 69—the total gain, making no allowance for the gain of No. 4, from 22d April to 30th May, which was not ascertained, was 287 lbs.

The gain of No. 1, 2 and 3, from 22d April to 25th June was 183 lbs. in 63 days; and allowing one peck to serve the three hogs for three days, required 5¼ bushels, the cost of which was $3 94. The live weight could not be estimated at less than 4 cents per lb. when pork was at market 6 cents.

The value of the 183 lbs. therefore was equal to $7 32, or at 5 cents to $9 15 cents.

The gain of the swine for the first 19 days, from 3d to 22d April, was

No. 1, 26 lbs. or 1.368 per day.
" 2, 34 " or 1.789 "
" 3, 20 " or 1.052 "
" 4, 24 " or. 1263 "

The gain from 22d April to 25th June, 63 days, was

No. 1, 62 lbs. or 0.984 per day.
" 2, 73 " or 1.158 "
" 3, 48 " or 0.761 "

The difference of daily gain in the two periods was attributable to the diminished quantity of meal. The question then arises, whether the first mode of feeding was as economical as the second.

In the first 19 days, 7 bs. 1 peck consumed, gave 104 lbs. gain. In the next 63 days, 5 bs. 1 peck consumed, gave 183 lbs. gain.

Had the first gain been in proportion to the second gain in reference to the meal consumed, the 7¼ bushels which gave 104 lbs. should have given 252 5-7 lbs. This great disparity can be explained only in the more economical preparation of the meal, by which a peck, taking up as much water as it would contain, gave a kettle nearly full of pudding, when half a bushel of meal, imperfectly prepared, gave little more. This seems to demonstrate the great advantage of cooked food, both as it respects its increase of bulk and the improvement of its nutritive properties.—Whether it would apply to those substances, whose bulk is not increased by cooking, equally as to Indian meal and the like, is a matter which experiments only can determine.

Such are some few trials in reference to the feeding and fattening of swine, which I have made, or information of which I have obtained from other sources, which may at least lead the in-

quisitive farmer to further experiments and inquiries, on a subject of great importance to his interest. The inferences to be made from them I shall leave to others. The results, as will be observed, are not uniform. The thrift of animals must depend on various other circumstances besides the kinds or the quantity of food given them. Much depends on the breed, as every farmer knows; much on the health of the animal; something on the season of the year. I failed in attempting to fatten several swine in one case, though they were carefully attended and various kinds of feed were tried, and the failure was totally inexplicable until they were slaughtered, when the intestines were found corroded with worms, resembling those found in the human stomach, and this, I have no doubt, prevented their thrift. The same fact has occurred in another instance, and with the same result. I failed in attempting to fatten some other swine, who had been driven a considerable distance and exposed, probably not even half fed on the road, to severe cold and storms. Some of them were frost-bitten in their limbs; and though attended and fed in the most careful manner they made no progress for months. In an experiment recently made, of giving swine raw meal mixed with water, I have found a falling off in their gain of nearly one half, compared with giving their food cooked, such as boiled potatoes and carrots, mixed with meal while hot; the result being, in a stye containing a number of swine, as 279 to 500. In respect to confinement or freedom, various opinions are entertained. The Shakers at Canterbury, N. H., deem it indispensable to the thriving of their swine that they should have access to water to wallow or wash themselves in; and that they by no means do so well without it. On this point I have had no trial further than to satisfy myself that fatting hogs are sometimes injured by being suffered to root in the earth.

With respect to the age at which it is advantageous to put up swine to fatten, I have only to remark, that it is with swine as with other animals, there are some breeds which come much sooner to maturity than others. A successful farmer in Saratoga county, N. Y., says that March pigs, killed about Christmas, are the most profitable for pork. Four pigs, of what is called the grass breed, were slaughtered at Greenfield, N. Y., which weighed 348 lbs. 318 lbs. 310 lbs. and 306 lbs. at nine months and seventeen days old.

On this point, I present a letter with which I was honored by the late John Lowell, whose authority in the agricultural community is justly estimated.

"Dear Sir,—

"I have been prevented answering your inquiries as to my experience in raising old or young pigs. I may say that I have fully and clearly ascertained, from a trial of twenty years, that young pigs of from 25 to 30 lbs. will give nearly double, in some remarkable cases three times, as many lbs. as shoats of six months weighing from 100 to 150. I have taken two pigs of 100 lbs. each, age six months, and never was able between May and November, to get them above 180, rarely above 170. I have taken three pigs, of about 30 lbs. each, and on the same food which I gave to the two, they would weigh from 170 to 180 each in the same period;—nay I have taken pigs of 200, and never could get them to weigh more than 300 in 7 months, on my food. The way I ascertain the quantity of food is, that I never give any thing but the produce of my dairy, and the refuse of the garden, peaches, apples, and cabbage, which are uniform generally.

3 pigs of 90 wt. or 30 wt. each, will give, ordinarily..... 510 lbs.
less original wt. 90 often not more than 60.
gain 420 lbs.

2 pigs of 100 wt. each, will give, ordinarily ..... 340 lbs.
less original wt. 200
gain 140 lbs.

"But the 3 pigs of 90 will not consume for the first three months half so much as the two of 100 each, and I have kept a fourth and sold it in August for quarter pork.

"There is nothing new or remarkable in these facts. It is the law of the whole animal creation. It is true of the calf and man. The child of 7 lbs. quadruples its weight in 12 months; and the calf of 60 wt. if fine and well fed, will weigh 600 wt. at the end of the year, and (if a female) will not double the last weight at any age.

"P. S. It should be remarked that the weight at purchase is live weight, and at sale dead or net weight, because in truth, to the owner this is the true mode of considering the subject. No doubt my sort of food is peculiarly favorable to young animals, it consisting in very liberal allowance of milk. If the older pigs were at once put on Indian meal, they would attain to 250 lbs. at a year old, but the cost of the meal, at 70 cents per bushel, would amount to 9 dollars, and if the first cost, 5 dollars 50 cents, be added, and the pig sold at 6 cents, there would be but 2 dollars gain on 2 pigs of 100 lbs. each; while 3 small pigs, without meal, fed on milk, would give 24 dollars in the same time. I do not mean to give minute details but general views. As an important qualification of the foregoing statement, it should be added that shoats of six months, bought out of droves, have usually been stinted in their growth, and animals, like trees, recover slowly after a check. I presume if shoats were taken from a careful and liberal owner, the difference would be less. But as a general law it may be safely affirmed, that weight for weight at the purchase, the younger the animal the greater the positive, and the far greater the net gain. At least such is my own experience and belief."

The preceding facts and experiments encourage the belief that hogs may be raised and fattened by the farmer to advantage, where corn is worth 70 cents per bushel, and his pork will bring him 6 cents per pound. Success must greatly depend on skill, care, selection, and good management. The best swine that I have ever found have been in dairy countries, for there cannot be a doubt that milk and whey for every animal are among the most nutritious of aliments. Indian meal probably ranks next, though many farmers prefer a mixture of provender, such as corn, oat rye, or barley; but I believe in all cases cook

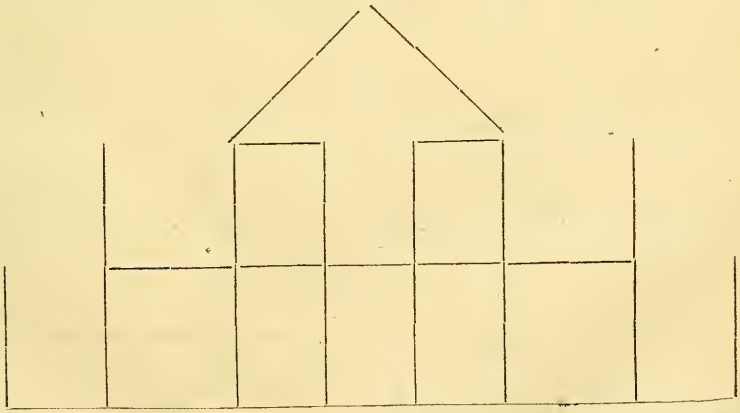
food will have a decided advantage over that which is given in a raw state: an advantage more than equivalent to the labor and expense of its preparation. Potatoes are a valuable article of food, but the pork is not so good as that fattened upon corn. Carrots are more nutritious than potatoes. Corn given in a raw state or on the ear is a most wasteful management.

Swine ought to be kept on every farm in sufficient numbers to consume all the offal and waste of the dairy and kitchen. If beyond this, a breed can be obtained, which will arrive at early maturity, and which can be advantageously grass-fed or kept at a small expense and in an improving condition through the summer; and being put up to fatten early in autumn and forced as much as possible so as to be sent to market early in the winter, the farmer will ordinarily find a fair profit in this branch of husbandry. A great advantage is found in the keeping of swine from the valuable returns of manure both in quantity and quality, which are obtained from them, where care is taken to supply them with raw materials for the munufacture. Too much care cannot be bestowed in the selection of the breed and the general health of the animal when put up to feed; and it is strongly recommended to every careful farmer occasionally to weigh the animal and measure the feed, that he may ascertain seasonably on which side the balance of debt or credit is likely to fall. Nothing is more prejudicial to good husbandry than mere guesses and random conjectures, though the result of our operations may not meet either our wishes or expectations, an intelligent mind will be always anxious as far as practicable to know precisely how far they correspond with or disappoint them.

The profit of fatting pork with us has become much more questionable since such vast amounts of salted pork and hams are brought into our markets from Ohio and the far Western States, through the great and constantly increasing facilities of transportation.

This must essentially affect our markets. But it is to be considered that to a certain extent our own pork here will always be preferred; and that fresh pork, the lean pieces, will always be wanted in our market, with which the Western pork cannot at present come into competition, though after the experience of the last five years, it might be almost rashness to say that our markets may not yet be supplied with roasting pigs and fresh spare-ribs from Cincinnati. Then again there is on every farm a certain amount of refuse and offal, which may be profitably given to hogs, and would otherwise be lost. There is another circumstance, which must go to the credit of ourswine Manure in Middlesex county is every where valued at least 4 dollars per cord on the farm.—A hog duly supplied with the raw material, for a hog cannot, more than an Israelite, make bricks without straw, will make three cords of valuable manure in a year. A sow well kept likewise, may raise a litter of pigs, and may be fitted for market in the same year. These circumstances may encourage us to think that, in spite of Western competition, a certain amount of pork may be profitably fatted among us every year. It is comparatively a recent discovery that apples are as good for fatting swine as potatoes. This opinion has been expressed to me by many farmers inthis county. Apples may be cultivated to an indefinite extent and at a small expense. We may easily avail ourselves of this advantage. The opinion of many of these farmers is, that they are better given raw than cooked. This point will, I hope, be made matter of experiment. The fattening of hogs, however, is subject to so many contingencies, that under present circumstances, excepting where extraordinary supplies of food are easily obtained, upon a large scale it can be safely undertaken only with extreme caution and care. Many, who have undertaken it, have been unsuccessful.

PLAN OF MR. PHINNEY'S HOG STYE.—End View.

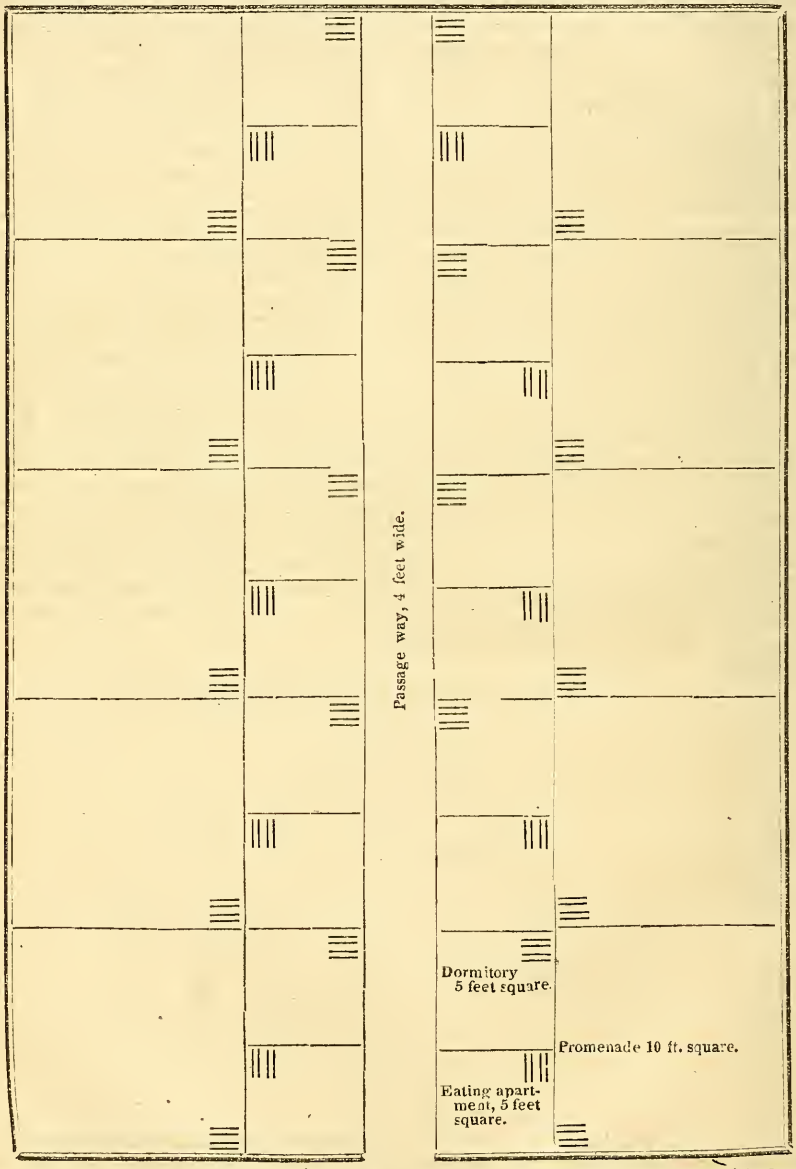


AN END VIEW.

The roof covers the passage-way and eating and sleeping apartments on each side, and is made sufficiently high to enable the feeder to pass between the pens. The floors of the eating and sleeping apartments are made perfectly tight; the floor of the promenade in the upper story is laid with narrow planks, placed about one inch apart, so that whatever is dropped by the pigs falls through on the compost beneath. The promenade

of the lower story has no floor. The only passage for passing the pigs out and in, is by a slide-door between each dormitory and the main passage-way. The pen being on ground which is a little higher at the end where the boilers are placed than at the orher, the floor of the boiler-room is on a level with the passage-way of the upper story, where the pigs kept in this part of the building are taken in and out. At the other end of the building, the floor of the passage way in the ower story is on a level with the natural surface of the ground, and by a door at that end of the passage-way, the hogs are taken in and out. You will perceive that a pen 100 feet long and 34 wide, with three in a pen, will furnish ample accommodations for 120 hogs. A passage-way for the feeder is made from the cooking-room to the passage-way in the lower story.

PLAN OF THE FLOOR OF THE UPPER STORY.



The foregoing is a rough plan, which may give an idea of the manner in which my hogs are kept. t is intended for the plan of the upper story on one end. The lower story corresponds with the upper, exeept that the promenade is extended out six feet from the line of the upper outside promenade line.

I

GEOLOGY
AS CONNECTED WITH AGRICULTURE.

BY WILLIS GAYLORD,
ONONDAGA COUNTY, N. Y.

No one who is familiar with the history of agriculture, who remembers what its condition was fifty years since, and is acquainted with its present state, can hesitate in admitting the rapid advances made in the practice of cultivation, or deny that very much of this success is owing to the application of the sciences to the art of agriculture. Processes formerly considered difficult and mysterious are now familiar to all; effects have in many important instances been traced to their causes; and results have been obtained by carrying out in experiment the deductions of science, which have been of the greatest benefit to the farmer. Thus the application of botany to the aid of the cultivator by such men as De Candolle, Macaine, Loudon, Lindley, and Liebig, has shown the necessity and advantages of rotation; the mode by which nature effects improvements in plants and fruits, and enables us to imitate, or in many cases to improve upon her; and in various other ways contributes to the comfort and the prosperity of the farmer. Chemistry, too, has rendered the most essential aid to the progress of skilfully conducted, and successful agriculture. By developing in a considerable degree the constituent of the most valuable plants, and teaching us the character of the soils we cultivate, it has enabled us to supply the ingredients that are wanting, or to correct any existing in the earth which are injurious. In the hands of Fourcroy, Davy, Chaptal, Faraday, Liebig and others, chemistry has been, and promises still more to be, one of the most efficient aids of the farmer. It has taught the essential elements of plants; it has shown the most profitable and successful methods of preparing various new manures and composts; and more than all, it has given us glimpses of the great pervading agent in all growth, nutrition, vegetable and animal organization, and promises to admit us still farther into that mysterious temple, where in silence and darkness the germs of animal and vegetable life first find existence, and the means of its continuance. Geology, the most modern of the sciences, which has sprung into being, and assumed form and method within the memory of many now living, has not been backward in offering its contributions in aid of the tiller of the soil. Formerly the earth was looked upon as a mere mass of inert matter; capable of touching nothing, and from which man had nothing to learn. That time is past! The earth is proved to be a volume full of the most important readings; a chronicle in which the events of illimitable ages are recorded; pages in which new proofs of wisdom and design are clearly manifest, and by which every observer is most eloquently invited to "look up through nature, up to nature's God." The crust of the earth, that part called its surface, and which is exposed to our notice, bears every where the most conclusive marks of change.—Examination of it proves that changes requiring long periods of time for their completion; changes involving the extermination as well as the creation of numerous races of animals and plants; changes which have affected the nature of the earth in all succeeding times, and still exert the most powerful influence on the social condition of man, have followed each other, until the earth had become fit for man's residence and the six days' work of the Almighty was crowned by his creation. To the lover of nature, the dust upon which he treads, has assumed a new value in consequence of the discoveries of geology. He sees that it has once literally lived; that the flint of our mountains, the red clays of our sea shores, the vast deposits in many of our swamps and bogs, as well as the myriad coral isles of the blue Pacific, are but the remains of the puny tribes who have done so much to change, and render habitable the face of our globe. He recognizes the great truth that life is a series of combined existences from the simplest infusoria to man, in which the decay of the one, has formed the step for the superior and more perfect organization of the next. Geology has shown that each step in the series is distinct; that species of plants or animals never pass into each other; that successive acts of creative power were exerted as the earth became adapted for higher and more complicated organizations; and that consequently there was a time when each species of plant and animal had a beginning, and the termination as well as the beginning of many, is marked with a distinctness not to be mistaken. The doctrines of eternal succession, or the formation of later species by successive developments of the earlier, to which some philosophers have fondly clung, are proved by geology to be inadmissible. It has been the custom with many to underrate the importance of geological studies, as though they led to no practical results, notwithstanding Sir J. F. Herschel has said "that next to astronomy, there was no science the pursuit of which promised more utility, or led to more exalted views of God and nature." Geology in fact, does for time, what astronomy has done for space; it carries us where all our methods of computation are lost, and we are lost in the infinite.—But it is not with the theoretical part of geology we have at present to do; our business is with the earth as it is, and our object is to point out the manner in which the changes that have passed over the earth's surface have rendered it not only fit for the residence of man, but under the direction of intelligence, of being vastly more productive than at present.

To understand the relation which geology bears to agriculture, and the way in which it can be made subservient to its promotion, it is necessary to glance at some of the revelations which the science has made in regard to the structure and

present condition of our globe. In the classification of the several strata of rocks that compose the crust of the earth, different writers on the subject have adopted different names for the successive masses; but we shall adopt the one which is most generally used, though less scientific than some of the other proposed nomenclatures, as understood by all, and based on reasons derived from the strata themselves, and obvious to every observer. Rocks from the lowest known, to those of the latest formation, are obviously divided into the stratified and the unstratified; but for the advantages of science, and the convenience of reference, these have been subdivided into the PRIMARY, TRANSITION, SECONDARY, TERTIARY, DILUVIUM and ALLUVIUM; this enumeration beginning with the lowest or earliest rocks, and ending with the surface covering or soil. We much question, however, the necessity or propriety of separating the transition and secondary rocks, as there are many things common to both; and writers on geology are by no means agreed as to the point in the series where the separation should be made.

The primary rocks, still beginning in the lowest part of the series, are granite, gneiss, mica slate, primary limestone, talcose slate, hornblende slate, quartz rocks, and clay slate. By some, all these rocks above the granite are termed metamorphic rocks, as they all, in some places, exhibit traces of stratification, while in others they appear destitute of this structure; a difference supposed to be the result of partial fusion, great pressure, or both.—The lowest, granite, has always the same constituents, (quartz, felspar and mica,) is obviously crystaline in all its parts, and formed by the gradual cooling of a mass in a state of fusion.—In these rocks, the result of chemical and mechanical agents alone are seen. Organic life appears not to have existed, at least no traces of organization are now remaining. It is from these rocks that all the strata have been formed by decomposition and deposition, and consequently in their essential mineral characters must partake more or less of the parent rocks. The limestones of this group are usually crystaline, sometimes called saccharine, from their resemblance to coarse grained loaf sugar, and furnishing the most pure and beautiful marbles. That it has in many instances undergone fusion, is perfectly evident from its position and appearance in connection with other primary rocks, of which Prof. Emmons's Geological Report of St. Lawrence county in this State, exhibits some striking instances. A line drawn from Ogdensburgh south through the valley of the Black river, the Little Falls of the Mohawk, to the Delaware, where it touches the line of Pennsylvania, would divide this State into two great sections, the east of which would belong as a whole to the primary formation, while west of that line not a trace of that formation exists, except in the erratic blocks or boulders scattered over the surface.

Above the primary group appears the transition, and here we enter upon a series in which the remains of organic life, low indeed in the scale, but still life, becomes associated with the mineral or earthy constituents, of which the strata are composed. Those geological writers that separate the transition series from the secondary, usually draw the line between the transition limestones or the silurian system of rocks, and the old red sandstone: but Prof. Buckland says, "It is most convenient to include in the transition series, all kinds of stratified rocks, from the earliest slates in which we find traces of animal or vegetable remains, to the termination of the great coal formation:" and the Palæontological chart prefixed to Prof. Hitchcock's Elementary Geology, shows that in many respects the whole of the transition and secondary series might, with propriety, be classed together. The principal difference will be found in the fact, that the animal remains in earlier rocks of the transition, though nearly allied in genera, will be found of different species in the more recent portions of that and the secondary groups. To the vegetation, rank and luxuriant of this period of time, are we indebted for the immense beds of coal which are now contributing so much to the comfort and prosperity of man; and in these beds, and their associated rocks, we trace the characters that marked their species, and their peculiarities. The plants, trees, &c, were such as are now tropical, and their magnitude, foliage, and numbers, demonstrate that the conditions of their growth in respect to heat, moisture, soil, &c, were of the most favorable, or rather forcing kind. In this earliest state of animal existence, we find the *Verterbrata, Mollusca, Articulata* and *Radiata,* though all are of the simplest forms; for instance of the first only fishes; of the second, many genera or families, such as the Orthoceratic, Producta, Nautilus, Terebratulæ, and others, some of which are extinct, while others have continued through all the formations; of the third, the Trilobites, a family now extinct; and of the fourth, there are abundant traces, of which the Crinoidea or lily shaped animals, affords specimens of great beauty. If we include in a single series both the transition and secondary, the rocks in the ascending order will be the cambrian or graywacke system, or older fossiliferous rocks; the silurian system, or graywacke slate and transition limestones; old red sandstone; carboniferous limestones; coal formation; new red sandstone; lias; oolitic system; green sand, and chalk. According to this classification, that part of this State, west of the line described above, would embrace all the rocks from the upper limits of the primary, to the lower series of the great coal formation, this series not being fairly reached until the State of Pennsylvania is entered.

Next succeeding the transition and secondary rocks, is the tertiary formation, in which the strata have been alternately deposited by bodies of salt and fresh water, as it proved by their organic remains. What are termed the marine strata, have their fossiliferous remains exclusively such as are found in the sea, and the fresh water strata show remains peculiar to fresh water. Indeed, in both cases, the fossil animals are such as are now found in the seas and lakes of the globe, in far the greatest number of instances, thus proving that the changes which have caused these formations, are comparatively recent, and bringing both the animal and vegetable remains nearer to our own times and existing species, than in the strata that have preceded them. The tertiary series has excited a very great influence on the surface, in fitting it for the residence and support of man.

Nearly all that part of the middle or southern States, lying between the first ranges of hills and the sea coast, belongs to the tertiary. It embraces the rich marls and green sands, which, in New-Jersey and other places, have proved such efficient fertilizers of the soil. This green sand is found in various countries, and as some doubts hove been entertained as to the principle most active in its aid to vegetation, we copy from Professor Hitchcock's Elementary Geology the analysis of specimens from different countries.

	Freneh green sand, by M. Berthier.	English sand, by Prof. Turner.	Massachusetts sand, by Dr. L. S. Dana.	New Jersey sand, by Professor H. D. Rogers.
Silica	50.0	48.5	56.700	49.27
Protoxide of Iron	21.0	22.0	20.100	24.67
Alumina	7.0	17.0	13.520	7.71
Water	11.0	7.0	7.000	5.91
Potassa	10.9	traces.	.....	9.99
Lime	.....	.....	1.624	5.08
Magnesia	.....	3.8	1.176	.....
Manganese	.....	traces, loss.	0.080	....

Potassa has been claimed as the sole fertilizing ingredient in this tertiary deposit; but, if such is the ease, the sand of England and Massachusetts should be worthless. It is probable the oxide of iron, lime, and alumina assist the action, and are beneficial without the alkali, although that would seem to be the most powerful agent in the deposit. "Throughout all this period," says Dr. Buckland, there seems to have been a continually increasing provision for the diffusion of animal life, and we have certain evidence of the character and numbers of the creatures that were permitted to enjoy it, in the multitude of shells and bones preserved in the strata of the tertiary formation.

The formation which succeeds the tertiary, is called diluvium, a word which implies that it has resulted from a deluge or deluges, but there is no good evidence that such is the fact. This deposit has received various names, such as *diluvium*, *erratic rock*, *group*, *boulder formation*, and more lately, *drift*, which latter term expresses its character, as it generally exists, better than any other. Of this great mass, which covers most of the surface of the habitable globe, Prof. Hitchcock remarks, "That it is composed of sand and gravel, of different degrees of comminution, mixed together in just the manner that violent currents of water would do it. This gravel is not often derived from the rocks beneath it, but from those at the distance of several miles, and in this country, usually from ledges which lie in a northwesterly direction. The surface of this gravel is often scooped out into deep basin-shaped depressions, and raised into corresponding elevations, the difference of level being from 20 or 30, to 100 or 200 feet." Where the decomposed rocks which have formed diluvium, belong to the clay, slates or shales, so much clay will be mixed with the mass of coarse gravel and sand, as to render it very compact and hard. Of this nature is the *crag* of the English geologists, and the *hard pan* of our farmers; the character of which, it will be seen at once, must be determined by the nature of the strata from which the mass is derived, and the proportion the several constituents bear to each other. In examining deposits of alluvium, the coarse pebbles and gravel will usually be found at the bottom, then clay, and at the surface, sand. If the clay is absent in drift to any considerable extent, the mass will of consequence be very porous and dry; if clay is in too great abundance, it is retentive of water, and, as a natural result, wet.

There is still another group, or stratified deposit, which is the result of causes now in action, and which materially modifies the surface of the earth, this is ealled alluvium. Modern geologists place the following among alluvial deposits, or classify them as belonging to this group. Soil, sand, peat, marl, tufa or travertin, coral reefs, siliceous sinter, siliceous marl, or the skeletons of infusoria, bitumen, sulphate of lime, hydrate of iron, hydrate of manganese, chloride of sodium, geic compounds, sandstones, conglomerates, &c. From this enumeration it will be seen that alluvium in some form, acts a most important part, and should be well understood by those who would determine the condition, geological character, and quality of soils. Alluvium is most frequently understood to mean only those depositions made by rivers, of rich friable earth; such as the banks of the Lower Mississippi, Po, Nile and Ganges, or in a morelimited degree, by most small rivers on which what are called interval lands are found. It will be seen, that used as a geological term, its meaning is much more comprehensive.

As all soils are made from the disintegration and decomposition of the rocks into earth, and then united with decayed organic matter, either animal or vegetable, a knowledge of the primitive materials from which the several stratified series of rocks are formed, will much assist in determining the character of the soils above them, or originating from them. Chemists have detected some fifty-three or four simple substances in the earth, or substances as yet incapable of further division, but there are of these only sixteen that are of any considerable account in the formation of the crust of the globe; and nearly all of these enter into the combinations in which they exist, not in their simple state, but as binary compounds. The following will show the names of the sixteen simple substances that we have said constitute the greater part of the globe.

1. *Metalloids or the bases of the Earths and Alkalies.*

1. Silicium.	4. Sodium.
2. Aluminium.	5. Magnesium.
3. Potassium.	6. Calcium.

2. *Metals Proper.*

1. Iron. 2. Manganese.

3. *Non-metallic Substances.*

1. Oxygen. 5. Sulphur.
2. Hydrogen. 6. Chlorine.
3. Nitrogen. 7. Fluorine.
4. Carbon. 8. Phosphorus.

The following are the binary compounds that constitute nearly all the accessible parts of the globe :—

1. Silica. 6. Soda.
2. Alumina. 7. Oxide of Iron.
3. Lime. 8. Oxide of Manganese.
4. Magnesia. 9. Water.
5. Potassa. 10. Carbonic acid.*

These compounds are termed binary, because they are composed of two of the simple substances; indeed it requires the utmost skill of the chemist to exhibit the base of these compounds in the separate state. This silica is composed of 52 parts of *silicium*, and 48 of oxygen; alumina of 53 parts *aluminium*, and 47 of oxygen; and the other compounds in a similar manner. Thus it will be seen that oxygen constitutes nearly one-half of the ponderable matter of the globe. It has also been estimated that its crust contains 45 per cent. of silica; 10 per cent. of alumina; 15 per cent. of carbonate of lime; 3 per cent. of oxide of iron; some of the unstratified rocks, such as felspar, contain from 10 to 14 per cent. of potassa, and the stratified rocks contain it in considerable quantities; while some basalts contain 6 per cent. of soda, and this compound enters extensively into the composition of the ocean. The other compounds are diffused more or less extensively, and though in small proportions, contribute essentially to the quantities of the earths, and their formation into soils.

In the following table No. 1, is shown the proportion of the metalic base to the oxygen in some of the most important rocks; and in table No. 2, the amount of silica and alumina in the predominant rocks of the primitive class; 100 parts of rock in each case being employed.†

No. 1.

	Base.	Oxygen.
Granite,.....	52	48
Basalt,.....	57	43
Gneiss,.....	52	47
Clay slate,.....	54	46
Sandstone,.....	49 to 53	47 to 51
Limestone,.....	52	48

No. 2.

	Silica.	Alumina.
Granite,.....	60.40	12.34
Greenstone,.....	54.86	16.56
Basalt,.....	52.00	14.12
Compact felspar,.....	55.50	21.00
Gneiss,.....	70.96	15.20
Mica slate,.....	67.50	14.26
Hornblende Rock	54.86	15.56
Talcose slate,.....	78.15	13.20

* Those who wish to investigate this subject further are referred to the Geological works of Lyell, Hitchcock and Bakewell.

† For the groundwork of these tables see Phillips and De la Beches' works on Geology, and Hitchcock's excellent Elementary volume on the same subject.

These tables will show in what manner, and from what sources the soil derives the respective proportions of its principal earthly ingredients; and where soils can, as they may in very many instances, be traced to the rocks forming them, the peculiar characters and qualities belonging to it may be determined with much certainty.—Eight or nine simple minerals only, constitute the great mass of all rocks. Quartz, felspar, mica, hornblende, carbonate of lime, talc, augite, and serpentine. Other minerals sometimes exist, as gypsum, common salt, coal, bitumen, pyrites, oxide of iron, &c, &c, which though found in small quantities, are not without their effect in modifying soils, so as to materially affect their productiveness.

It will be found that far the greater part of the population of the globe inhabit those parts covered with the transition, secondary, and tertiary formations, or matter on the soil that has been produced from the disintegration and decomposition of these rocks. In the language of Professor Buckland, "The process is obvious, whereby even solid rocks are converted into soil fit for the maintenance of vegetation, by simple exposure to atmospheric agency; the disintegration produced by the vicissitudes of heat and cold, moisture and dryness, reduces the surface of almost any strata to a comminuted state of soil, or mould, the fertility of which is usually in proportion to the compound nature of its ingredients." But whatever may be the character of the rock, examination shows that when sufficiently disintegrated, and combined with the proper quantity of decayed animal or vegetable matter, fertility to some extent will be induced.

Sand, clay and lime, are the three principal ingredients of all soils, and on the proper proportions, and intermixture of these, the qualities of all cultivated lands may be said to be depending. Either of them alone, and in a state of purity, is comparatively barren; but when the mixture is effected as by the addition of clay to sand, fertility is ensured. The more thoroughly this comminution and intermixture has taken place, the better will be the soil produced, as from the proportion in the primitive rocks of the globe, which the three principal earths bear to each other, it is clear a full mixture of those derived from them will give most usually the proportions necessary for productiveness. It is one of the most beautiful illustrations of design in the order of nature, that while the granitic or primitive rocks on their first disintegration are less favorable to cultivation and production than those from later formations, they are for the most part confined to mountains or mountain districts; while the lower, level, more temperate, and easily cultivated regions are composed of the disintegrated masses constituting diluvium and alluvium. There is no conceivable way in which the thorough mixture of the earths, so requisite to fertility, could have been accomplished so effectually as by the breaking up, and grinding down, which is the result of repeated disintegrations and depositions. On these previous processes of nature, the whole tillage of the soil is suspended; and without them there could have been no agriculture.

The masses of fossiliferous rocks, embracing the whole series from the lower transition to the

upper tertiary, have had their thickness variously estimated by geologists. The principal sources of difference lie in the lower transition, while all above present a remarkable uniformity. Prof. Phillips's estimate of the thickness of these fossiliferous rocks, is the lowest, being about 34,000 feet or more than six miles; while the greatest is that of Dr. Smith, which is 142,800 feet or not far from 27 miles. In these, we trace the progress of organized life, from the simplest and half vitalized polypi and coldblooded animals, and the marine plants or fucoids, up by regular or scarcely interrupted gradations, and the successive developments of higher and more complicated organizations, till the earth had been fitted for the abode of man; and the last and crowning act of creative energy placed him upon it, as master of the whole. From the depths of these series of rocks, entombed for countless ages, we draw forth remains which the skill of a Cuvier has placed bone to bone, and exhibited forms so dissimilar to those now existing on the earth, that nothing save their veritable skeletons before us, would induce a belief in the possibility of such organization. "The peculiar feature in the population of the whole series of secondary strata," says Prof. Buckland, "was the prevalence of numerous, and gigantic forms of saurian reptiles. Many of these were exclusively marine, others amphibious: others were terrestrial, ranging in savannas and jungles, clothed with a tropical vegetation, or basking on the margin of estuaries, lakes and rivers. Even the air was tenanted by flying lizards, under the dragon form of Pterodactyles. The earth was at that time, it is probable, too, much covered with water, and those portions of land which had emerged above the surface, were too frequently agitated by earthquakes, inundations, and atmospheric irregularities, to be extensively occupied by any higher order of quadrupeds than reptiles." These perished plants had produced those beds of coal, which we are now using; and these uncouth reptiles have elaborated many of those substances, which in the soils formed from the decomposition of their enclosing strata, constitute no trifling element in their fertility.

Of the thickness of the unstratified rocks, we of course have no possible means of deciding.—That it is very great, there can be no doubt; and this is proved by the examination in many places of the masses of primary rock, and their inclination to the horizon. Thus, Professor Pallas, notices in the peninsula of Tauris, an unbroken series of primary strata, which, after making allowance for their inclination, would give a perpendicular thickness of more than 68 miles; and according to Prof. Hitchcock, the railroad from Boston to Albany, in passing from Westfield to Pittsfield, is carried over strata of primary rocks, nearly perpendicular, for at least 20 miles. If, as is now generally supposed, the interior of the globe is in a state of fusion, or semifusion, it is probable this crystalized crust extends from the surface to the point of fusion; and although in penetrating the earth, the increase of temperature is such as to justify the opinion that an intense heat must exist in the interior of our planet, the different action of heat when under great pressure, and when free, does not enable us to decide positively the present thickness of the earth's crust. Reasoning from different data, or different series of experiments, philosophers have variously estimated the thickness of this crystalized mass, from 150 to 250 miles in thickness.

The processes by which soils are formed, suitable for the purposes of agriculture, would appear something like the following. All the earths must have been derived from the disintegration and decomposition of the primary or crystalized rocks. They could have had no other origin. Deposited in the waters of the earliest seas, the abode of the first created animals and plants, the successive layers and strata of the lower transition, or fossiliferous rocks were deposited. That there should have been a state of great quietude existing in the elements at this period, is evident from the perfect state or condition of the organized remains of this series, proving that they lived and died without experiencing those great convulsions which mark a later period of deposit. The regularity of the strata is further evidence of this fact. When these strata were, by some convulsions of the earth, lifted from the seas in which they were deposited, a new series of disintegration commenced, of which the transition, rather than the primary, were the subjects. Now the secondary and the carboniferous strata were deposited, and that too, it would seem in great degree under the same conditions of quiet waters as in the former case. Succeeding revolutions broke up the new formed rocks, and exposed both them, and the older ones, to fresh disintegration and deposition. In this way, the tertiary and upper rocks were produced, abounding in proofs of organic life; but frequently in such conditions as to show that the changes to which the earth was subject, were sudden and violent. The action of currents, glacial action, and the influence of atmospheric causes now appear, in the masses of drift, diluvial matter, boulders, &c, which cover the whole surface of the earth, with few exceptions; and exhibit the most abundant evidence, that organization in plants and animals, had reached a point rendering the globe a fit residence for man, and on which we now find him, the last created, and most largely endowed resident.

That the earths which constitute the basis of soils, and form the groundwork of agriculture, were derived from the original primary rocks, is so apparent that no one seriously thinks of controverting the fact. The repeated changes and disintegration, large masses of them have been subjected to since that time, have so mingled the original constituents, as to destroy, in a great degree, their original character, while at the same time they are much better fitted for the purposes of the agriculturist, than they could otherwise have been. There is one great error, however, into which geological writers have frequently fallen; and that is, while the formation of soils is admitted to be owing to the disintegration of rocks, they are supposed invariably to resemble the strata lying immediately under them. In some few instances, this may possibly be the case, but they are so rare, and produce so little influence on the agricultural character of a country, that they are hardly worth taking into account. On the contrary, the course of the currents, or the action of those causes that have produced and deposited the drift or diluvial covering of the

globe, must be taken into consideration, if correct results would be arrived at; since on these the fitness or unfitness of a soil for culture is mainly depending.

The direction of that action which has produced the drift on this continent, and fashioned its surface, whether we suppose it to have been diluvial currents, or the movements of glaciers, is so clear, that no room for doubt is remaining. Pebbles, boulders, or masses of rock, since the geological structure of the country has been investigated, can be readily traced to their original beds, no matter where found, and the course in which they have moved since their first breaking up, is also the course of the action to which their removal is owing. Throughout the whole American continent, from Nova Scotia to the Rocky Mountains, this action has been from the north to the south, with occasional slight deflections owing to local causes. This is proved by the boulders, which not only are found invariably to the south of the places from which they were derived, but are larger and more numerous near their original location, than farther from it. Thus, the whole of the vast transition formation which reaches from the Little-falls of the Mohawk in this State to the Rocky Mountains, embracing the valley of the great lakes of the St. Lawrence, and the upper valley of the Mississippi and its tributary branches is covered with boulders from the primitive rocks to the north of the territory named. Thus, Mr. Catlin found at the famed Red Pipe stone quarry, beyond the Mississippi river, granite rocks of 25 feet in diameter, that must have drifted several hundred miles from the north; and boulders are seen on the banks of the Ohio, derived from the primitive ranges north of the lakes, and which, therefore, must have traversed at least 500 miles. The same facts, according to Lyell, Greenough, and De la Beche, occur on the continent of Europe, proving the existence of a similar action, whatever that might have been. It is to this action, that the polished and grooved rocks of such large sections of our country are owing, showing existing forces sufficient to round or grind down the hardest masses. This action has excavated the beds of the great lakes, as well as the parallel valleys and smaller lakes of Western New-York, and spread the diluvial matter, so formed, over districts farther south. This will be evident to all who have examined the country with a view to its agricultural character as depending on its formation. In crossing the State from north to south, a variety of rock formations are passed, or rather ascended, sandstones, limestones, shales, &c, in various alterations, yet not a particle of these are found north of the beds where they originated, but the drift is invariably to the south. This fact has had a vast influence on the agricultural character and capability of the west, materially determining the nature of the soil, and its productions.

The intimate intermixture which the changes before spoken of have produced on the quality of soils, is one great cause of the power of producing vegetation which exists in most masses of earth to a considerable distance below the surface. At the period of the formatiom of drift, plants and animals had long existed on the earth, and the effects of their deposition and decomposition has pervaded the whole mass. Soils made from the sedimentary rocks, are with few exceptions more fruitful than those from the primary ones. There is not, however, in all cases the same fertility, or power of producing vegetation, in the earths. In some cases it exists only on the surface or very near it; in others, earth thrown from a depth of ten or twenty feet will be as productive as surface earth. If the upper deposites are porous, it is uniformly found that the elements of fertility will be deep, thus showing that the ingredients that render ths soil fertile, such as humus or vegetable manures, or salts, are carried downwards through the diluvium by infiltration. This will account in part for the different effects which earths taken at the same depths below the surface, as in digging wells, ditches, &c, in different places will produce. In some places the character of the deposite is such that the fertilizing matter produced in a succession of ages, has made no impression, but either remains on the surface in the shape of muck, or has been carried off by the action of the elements; *dense pan* is of this description. If thrown upon the surface of cultivated lands it remains unfertile for a year or two, until by the action of the elements, by aëration and disintegration, the unfavorable qualities are mitigated or changed. In other places the earth thrown out and spread on the surface, possesses so largely the essential elements of fertility, that it serves as a top dressing of manure, and adds largely to the crops grown. The western States are examples of this depth of fertile soil, and instances elsewhere may be adduced. Where such soils lie on a limestone basis, the common impression is that the depth, whatever it may be, is owing to the disintegration of the lime rock. This is erroneous, as such soils in many cases do not contain more lime than others, and the fertility to such depths is owing to their mechanical composition, their dryness, and consequent warmth. Some very compact clays are found to serve well as a top dressing on soils, but their efficiency will, in nearly every case, be found on examination to be depending on the lime they contain, thus making them a marl. Where this is not the case, if spread over porous sands the effect is excellent. The fine farm formerly owned by Judge Buel, near Albany, is an example of this, and shows that where the mechanical mixture of the earth is not of the proper kind for fertility it may be corrected, and the mass rendered productive in the highest degree. The sand plains between Albany and Schenectady are geologically constituted on the surface, of light drifting sands to the depth of thirty to fifty feet; this rests on clay from seventy to one hundred and twenty feet in thickness; and this on the common rock of the region. To correct the sandy character of the soil, which had hitherto been deemed almost hopeless, Judge Buel transported from the clay hills of Albany a quantity of that material (which in addition to the clay is rich in lime) as a dressing for his sands, and thus secured the tenacity requisite for the retention of moisture, and the proper action of manures. It may be remarked here as a geological fact of much interest to the farmer, that where the surface is a sand, the underlying strata is a clay, such as when mixed with the upper strata or soil, will make an excellent one for tillage and cropping.

That the soils now existing could not have been formed from the rocks immediately below them, is evident from the fact that a large portion of the transition rocks of this State have their upper surface now smooth and polished, exhibiting no marks of decomposition, but only of abrasion. This is not the case with the limestone and harder rocks only, such as those of Rochester and Lockport, but large tracts of the Marcellus shales, one of the softest and most easily decomposed rocks in the series, presents a similar appearance. We have seen this highly smoothed and grooved or striated surface on the high hills in the south part of Onondaga county, eight or nine hundred feet above the level of the Erie Canal, and polished boulders of the same rock are frequently seen in or on the drift to the south of their original position. This movement of the diluvium or drift to the south, explains the cause why clay soil is sometimes found on sandstone rocks, sandy soils on the limestone strata, or a strong limestone soil on the shales. It also explains the reason why the character of soils in the same neighborhood or town should sometimes differ so widely, these things depending on the action of the currents, their freedom or obstruction. Thus, for instance, we know a town lying above, or to the south of the great range of mountain or crinoidal limestone that traverses the State from east to west, or from the Helderberg to Buffalo. The western half of the northern front of that town shows a gradual descent to the limestone strata, interposing no obstacle to currents or the transportation of drift; while a deep valley of some two miles in width, and showing a south boundary of some six hundred feet elevation, cuts off the eastern half of the town from the same strata. The result is as well marked in the character of the soil, and its adaption to particular crops, as in the timber and natural growth of the two sections. The west half, or that which presented no obstacle to the transportation of drift, was covered with oak and chesnut. On the shale rock, which forms the substratum of the whole town, limestone boulders are so plentiful that they are collected and burned for lime; the soil is a fertile loam, shallow, but producing large crops of excellent wheat; in short, it exhibits all those characteristics which mark the soils lying immediately south of the limestone series of rocks in other parts of the district. The east half of the town, on the contrary, that part where the diluvial action was obstructed by the deep valley alluded to, though of the same elevation as the other, has a widely different constituted soil from the west. The timber is beech and maple, the subsoil a dense clay hardpan, no limestones or but very few are found, the surface soil is a muck instead of loam, and the culture of wheat is much less profitable or certain than on the western half. It is excellent for grass or for spring grain, but the quantity of clay in soil produces the same effect that it does on lands still further removed from the effect of the limestone series, and renders wheat very liable to be frozen out during the winter. The drift which should have been spread over the east part of that town, is now lying piled in large masses covering hundreds of acres, and from one to two hundred feet in hight, in the valley below, evidently deposited by the eddies, or deflexions of the currents, which the mountain front of the town to the north of this place caused. Nor is this a solitary instance of the influence which opposing obstacles have had in the distribution of drift, and thereby determining in no inconsiderable degree the agricultural nature of soil.

It is to the proper mixture of a few of the earths already named, and the combination with those of *humus*, or decomposed animal and vegetable matter, that fertility is owing. A variety of experiments have been made by different men, to form artificial soils, or by differently compounding the earths, ascertain that mixture the best suited to vegetation. The experiments of Tillet resulted as follows: the most fertile mixture he could produce was composed of three-eighths clay, three-eighths finely pulverized limestone, and two-eighths of sand. These reduced to their elements gave of coarse sand 25 parts, silica 21 parts, alumina 16.5 parts, carbonate of lime 37.5 parts. The quantity and kind of vegetable matter incorporated is not stated. It is certain that the most careful examination of arable soils does not give any thing like the quantity of carbonate of lime used by Tillet; and it is therefore right to infer that the proportion of lime was far greater than is necessary, when combined as we find it in the soil, to promote the highest fertility. A knowledge of the constituent parts of soils will show how they are geologically as well as practically combined to be suitable for cultivation; for if, owing to geological position, any single ingredient is in too great proportion, such soil will fail in some essential respects. We shall therefore present an analysis of soils from different parts of the world, to show that the necessary and general elements of fertility are every where the same.

An analysis by Chaptal, of some fertile alluvion on the Loire, gave in 100 parts:

Siliceous gravel	32
Silica	10
Calcareous gravel	11
Carbonate of lime	19
Alumina	21
Vegetable matter	7

Davy, in his Agricultural Chemistry, page 162, gives an analysis of a fine wheat soil, Middlesex, England:

Carbonate of lime	28
Silica	32
Alumina	29
Animal or vegetable matter	11

The following is the analysis of a soil on the farm of E. Phinney, Esq., Massachusetts, cultivated for more than 100 years, made by Dr. Jackson. By comparing that soil with others on the same farm in a native state, it contains more soluble humus, and has consequently been improved by culture, a state which should always be the result of farming or tilling of a soil.

Vegetable matter,	8.9
Insoluble silicates,	81.2
Peroxide of iron,	4.3
Alumina,	4.0
Phosphate of lime,	1.0

A specimen of the rich alluvion of the Nile was analyzed by B. Silliman, Jr. and gave the following result:

Vegetable matter, ... 6.90
Silex, ...47.39
Alumina, ...32.10
Peroxide of iron, ...11.20
Phosphate and crenate of lime 2.02

Dr. Jackson analyzed a specimen from the bank of the Mississippi, 100 miles above New-Orleans, and obtained these results:

Water absorption, ... 3.9
Vegetable matter, ... 3.6
Peroxide of iron and alumina, ... 7.0
Carb. phos. and crenate of lime, ... 2.8
Insoluble silicates, ...81.4

The same gentleman also analyzed a very rich soil from Batavia, in the East Indies. The vegetable matter in this, makes it resemble the muck soils of some part of the west.

Water of absorption, ... 7.8
Vegetable matter, ...24.9
Peroxide of iron, ... 7.9
Alumina, ...14.8
Phosphate and crenate of lime, ... 2.0
Magnesia, ... 0.3
Insoluble silicates, ...43.0

A specimen of the best river alluvion from the Hudson, near Troy, analyzed by Prof. Eaton, gave the following:

Silex, (including small stones and pebbles,) ...75
Alumina, ... 7
Carbonate of lime, ... 3
Animal and vegetable matter, ...11
Soluble salts, ... 1
Water of absorption, ... 3

The following is an analysis by Prof. Hitchcock of 5 specimens of soils from the western states. Under the heads of soluble and insoluble geine, will be found the animal and vegetable matter of these soils.

	Soluble geine.	Insoluble geine.	Sulphate of lime.	Phosphate of lime.	Carbonate of lime.	Silica.	Water of absorption.
Rushville, Illinois,	7.4	2.5	3.4	0.6	1.5	84.6	0.3
Sangamon, do	4.9	5.6	1.2	0.4	1.3	86.6	6.3
Lazelle, do	7.6	13.8	1.4	0.4	3.3	73.5	8.5
Peoria, do	3.1	4.8	3.5	1.0	.....	87.6	5.8
Sciota Valley, Ohio,	4.5	6.7	2.1	0.9	2.8	83.5	5.3

The soil from Lazelle had never been cropped, while that from the Sciota had produced corn 14 years successively, without manure.

The following analysis was made by Dr. Lapham, civil engineer, of the soil from a part of his father's farm, on a branch of Mad river, Ohio, which by constant cropping, without regard to rotation, had been so reduced as to be unfit for wheat.

Water of absorption, ... 6
Organic matter, ... 3
Siliceous matter, ...80
Alumina, ...8
Peroxide of iron, ... 3

An examination of these several analyses will show that silica, lime and sand are present, as the principal earths in all soils; that the fertility is greatly depending on the amount of vegetable matter; and that where either of the earths is in excess, or wanting comparativeness, barrenness is the result. Chaptal found that when the clay in a soil exceeded 50 per cent. it was unfit for cultivation, and that all over 20 per cent. might be considered rather injurious than otherwise. On the contrary, most fertile soils contain from 60 to 80 per cent. of silica, unless in cases where it is replaced by calcareous gravel. Some soils which had been abandoned on account of the amount of sand they contained, have been rendered fertile by placing on them small quantities of clay; proving that where other circumstances are favorable, a small amount of clay will give the required tenacity, prevent the too rapid descent of manures, and secure the proper supply of moisture. Soils that contain too much alumina are very heavy and retentive, and are apt to be wet and cold. Where there is a large supply of lime gravel, as in the soil analyzed by Davy, a larger per cent. of clay is admissible, and frequently proves one of the best in the world for wheat, as is proved by the analysis, and crops of some of our best wheat districts. The absence of either of these essential earths will prevent fertility, as the want of lime in that of Mr. Lapham prevented the growth of wheat; a result to have been expected from the analysis of other non-wheat producing soils.

If soils were uniformly produced by the disintegration of the subsoil strata, those on limestone would be the richest in that element of fertility. Such, however, is not the case; and strange as it may seem, there are some soils lying on limestone rocks which do not contain the least appreciable quality of that article. This may easily be accounted for by the fact that in the transportation of diluvium we have described, that which now rests on the limestone came from strata that contained little or no lime. Sand is so much more generally diffused in all rocks than in the other earths, that it is scarcely possible to find a soil where it is not present, and some of the most fertile districts are those where the sand has been cemented by lime, making, when broken up, calcareous sand.

The State of New-York furnishes examples of all kinds of soils; those produced from every variety of formation, and of almost every shade of intermixture. The lower counties on the Hudson river, and the territory between Lake Champlain and the Black river, now mostly a wilderness, are examples of primitive formations to a great extent. The soil of the river counties, a

though formed in a great measure of granite, gravel and sand, has been so incorporated with the drift from the transition series, that the mixture makes one of the most fertile soils, when properly manured and cultivated. Morton, in his excellent work on soils, remarks that those kinds of granite rocks which contain large quantities of felspar, are from the potash they contain, liable to decomposition when exposed to atmospheric agencies; and when mixed with the quartz of the granite, the clay of the felspar, and well manured with calcareous matter, sea shells, lime, &c, form soils most productive of wheat and barley.

Prof. Hitchcock, in his Economical Geology of Massachusetts, says, that "the compact felspar that forms the basis of porphyry, frequently contains an unusually large proportion of alumina, frequently from 15 to 30 per cent. And although this is the hardest of the rocks around Boston, in many places it decomposes rapidly, and the resulting soil admits of high cultivation, as at Medford and Lynn." The condition of our primitive districts proves in a great degree the correctness of these opinions. The agricultural settlements bordering on the great granitic formation north of Montgomery and Saratoga counties, and west of Champlain, have proved that their soils, evidently the result of the decomposition of granite or felspathic rocks, require nothing but the liming and manuring spoken of by Morton, to render them most fertile; and the high state of cultivation in some of the river counties is proof of what such soils are capable in the hands of the skilful farmer. Soils of this class in all countries have been found very durable, a fact which Liebig explains from the abundance of potash contained in the felspar, and which is given out by gradual decomposition. Soils from the gneiss rocks are usually of an inferior quality to the granitic ones, from the felspar being frequently in a less proportion, and consequently the clay and potash of that mineral being wanting. Where the gneiss contains abundance of felspar, the soil has no perceptible difference from the best granite ones, and when treated in the same manner will be equally productive. Some of the best root soils in the world are from this rock, for instance the celebrated carrot and parsnip soils of Guernsey and Alderney; where the latter root is produced in greater perfection than any where else.

The great transition formation of western New-York furnishes examples of all the soils which such rocks can produce, from the coarsest pebbles to the most compact clay; soils in which comminuted limestone forms a large proportion, and that which is destitute of this element; soils varying from the lightest sands to the heaviest clays. On these the agriculturist finds soils adapted to every product, and capable of every modification and course of culture. There can be no question but that a natural difference exists in the soils of this formation, and the line is very distinctly marked in many respects by the water shed that separates the streams of the lakes from those of the Susquehannah and Ohio. It will be found that the soils on the northern or lake slope are much better adapted to the production of corn, wheat, clover, &c, than those on the southern one, or rather on that part watered by the streams that flow southwardly; and there can be no doubt that this difference is caused by the geological structure of the two sections. On the northern slope, in the course of thirty miles, no less than three distinct deposits of lime rock are found, two of them of great thickness, besides several minor deposits. Indeed, the whole mass, sandstones and shales, contain so much lime as to effervesce freely with acids. The first of these is the deposit which forms the falls of Niagara, in which the quarries of Lockport are found, which causes the falls of the Genesee at Rochester, and crosses in its course eastward the Oswego river at Fulton. The second deposit is the one which may be traced from Black Rock through the counties of Genesee, Livingston, Ontairo, Seneca, Cayuga, Onondaga, Madison, &c. This mass is of great thickness, and has produced the greatest effects on the agricultural character of the soils in these counties. The Oriskany sandstone strata, which lies between this deposit and the gypseous ones is made of coarse sand cemented by lime, and when mixed with the marly or gypseous clays from the shales lower in the series, or to the north, gives an excellent soil, wherever its influence is felt from Oneida to Ontario. The upper deposit of limestone is the one called the Tully limestone, and is of limited extent and thickness, compared with the others. This deposit extends from the vicinity of Cazenovia westward across the counties of Onondaga, Cayuga, and part of Tompkins and Seneca. The mass called by the State Geologists, Marcellus shales, some seven or eight hundred feet in thickness, lies between the Tully limestone and the Onondaga or crinoidal limestones. From the Tully limestone deposit there is not another till the carboniferous deposits of Pennsylvania are reached, leaving a district of some forty miles in width destitute of this rock. The rock strata of this transition district of New-York furnishes in the red shale that lies between the gypseous formation and the Rochester series of lime rock, and in which the lead of the Onondaga and Oneida lakes are mostly excavated, a curious instance of the manner in which a deposit will run out, allowing the strata above and below to come in contact, while at another they are widely separated. Thus this red shale deposit, which, from Oneida to Onondaga or Cayuga, is not less than three or four hundred feet in thickness, disappears to the west, and at the Genesee river and the Niagara, allows the gypseous shales to rest immediately upon the Lockport or Rochester limestones. The result is, that the beds of reddish clay, which are so common in the counties east of Ontario, and which have been produced from the decomposition of the red shale strata, are not known at the west, where the strata has disappeared.

No one who is acquainted with the character of the soil, and their agricultural capabilities, in these two sections of western New-York, that is, the northern and southern, will hesitate to ascribe the difference to their different geological origin. The influence of the lime deposits on the lake slope is too obvious to be mistaken; and the consequence of its absence on the part watered by the streams flowing south is equally certain. The vegetation is in some respects dissimilar, and the

agricultural products are to a considerable extent, distinct. In short, there are few districts in any country where the influence of geological strata on the soil and its agriculture is more marked, or can be studied to better advantage, than in western New-York.

A knowledge of the geological character of soils, and the position of the strata from which they are derived is of great consequence to the farmer. By this he can in a great measure determine their capabilities, their essential elements, and the changes it is necessary they should undergo in order to the greatest fertility. The strata and the sub-strata, the diluvial deposits, the course of the currents from which they were derived, the mechanical constitution and condition, with their different degrees of porosity or tenacity, are all to be geologically considered. There are, it is well known, some soils called hungry, or which absorb all the manures and other substances put upon them by the farmer with such rapidity and so little effect that their cultivation with profit may be considered as almost hopeless. To the superficial observer such soils do not greatly differ in appearance from another class of soils which constitute one of the most valuable and productive. To the geological character of the strata from which these soils are derived this difference is to be traced. Siliceous gravel or sand from rocks loosely cemented will, when deposited, offer little resistance to filtration, and do not retain water sufficient for the ordinary purposes of vegetation. When this gravel or sand is from strata of which alumina is the principal cement, the deposit will, while it retains all the necessary friability for easy working, also be retentive of moisture sufficient for plants, and yet not be liable to injury from stagnant water. Where the soil is derived from clay shales, it will be too retentive and compact, be heavy and hard to work, and subject to injuries from stagnant water either on or below the surface.

There is no operation in the preparation of land for tillage, to which modern agriculture is more indebted than to the system of thorough draining; that which takes off not only the surface waters, but those which coming from below, follow the course of the strata, and render large tracts worthless and unproductive. No manure can produce its proper effect on soil saturated with moisture. Lime does no good unless the soil is in a dry condition, and it produces the most effect when laid on in the driest part of the season; and every farmer who uses gypsum, knows that precisely such is the case with the use of that invaluable mineral. The English farmer finds that bone dust is powerless on wet soils, and our own experience abundantly proves, that barn-yard manures are much more efficient on moist soils, after draining, than before. But to drain land properly and effectually, to be certain of making no useless expenditure of money and labor, the geological condition of the farm or field must first be ascertained. It is not enough to ascertain which way the water will run when the drains are dug, but the dip and formation of the water producing strata must also be determined. The first may be done by the eye, or by the spirit level; but the last will require examination of the inclination, and position of the impervious subsoil, and nature of the springs, by attention to the position of the strata, its outcrop, and by using the auger freely. From a want of attention to these things, many farmers fail in their efforts at draining, and expend much money most unprofitably. An ordinary knowledge of the principles of geology, and their application, would prevent this, and ensure all the benefits which skilful thorough draining is sure to give.

Geology, then, is not that useless, barren science, which many who have paid little attention to it, imagine it to be. There are few of the natural sciences, less speculative, or which have more direct, and important practical bearings. To the agriculturist, a knowledge of the facts it affords, is particularly valuable, leading him to practical results in many of his operations, of the first consequence. It teaches the origin, mechanical composition, and qualities of soils, and shows in what respects they may be improved or amended, by the addition of those essential earths, in which they are naturally deficient. A knowledge of the principle of geology, and the causes which have operated to produce the present condition of the surface of the globe, would enable the purchasers of land to avoid many of the errors and mistakes into which they frequently fall; and enable the farmer to procure such soils as are suitable for the business he intends to follow, whether the production of grain or the raising of cattle and sheep; since the fact is indisputable, that the districts in any country are very few, where the soil is equally adapted to grain and pasture.

As a historical record of our globe, and its mutations, geology does that for us which nothing else can do, so clearly and so definitely. It goes back far beyond all documents written by the finger of man, and on the imperishable pages of the mighty volume it unfolds to us, in characters traced by the hand of Almighty power itself, we read of times and seasons, and eras, to which the assigned limits of man's residence on this globe, is but as yesterday. In studying the characters so traced, man may err, but there can be neither impiety nor presumption in endeavoring to translate them, and bring them within the bounds of human understanding, or rendering the truths they teach subservient to utility, and the ends of industry, knowledge and human happiness.

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